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HOSPITAL INFECTION OF WAR WOUNDS*

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During the war of 1914–18 hospital infection of war wounds was described by certain bacteriologists and surgeons (Stokes and Tytler, 1918–19; Fleming and Porteus, 1919; and Report, 1919), and since that time a number of outbreaks of surgical hospital infection have been recorded (for references, see McKhann *et al.*, 1938). In the present war Levaditi *et al.* (1939) gave evidence of bacterial infection apparently added at a base hospital in France, and it has been observed in certain British hospitals when, as a consequence of the evacuation from Northern France in early June and of intense aerial warfare in this country, they had to deal direct with the war-wounded.

Hospital infection—infection of the tissues with pathogenic microbes derived from the hospital environment—has long been recognized as a risk to patients. To the surgical patient the risk has been greatly reduced by the practice of antisepsis and asepsis and of the segregation of grossly infected cases. It is less generally recognized, however, that the risk is still serious. During treatment patients are often infected by one another or by the hospital staff, and the hospital staff are themselves sometimes infected by the patients.

Hospital infection in a previously non-infected patient is recognizable clinically only if a distinct symptom-complex directly referable to infection—for example, sore throat, fever, cellulitis, erysipelas, or septicaemia—appears in the course of treatment. It may sometimes be inferred from the delayed healing of a supposedly clean wound or from the failure of a skin graft on apparently healthy granulation tissue. Often infection occurs in those already infected; sepsis is piled upon sepsis, frequently with no obvious change in the patient except perhaps an aggravation of already evident signs. Such acquired infections are recognizable by bacteriological examination. War wounds, many of which are infected by certain species of bacteria at the time of wounding, may acquire a different flora during treatment. For example, the appearance of *Staph. aureus* in a previously clean compound fracture; the sudden appearance of *Strep. pyogenes* in a wound that has yielded nothing but *Staph. aureus* during four consecutive weeks; or the gradual replacement, in a dirty wound, of *Cl. welchii*, *Cl. sporogenes*, and micrococci, by *Bact. coli*, and later by *Ps. pyocyanea* (*B. pyocyaneus*) and *Staph. aureus*.

These occurrences are most reasonably interpreted as hospital infections. However, the sudden appearance of a new microbe in a wound is held by some to be due to the late multiplication of a microbe that has remained dormant since its introduction at the time of wounding. As even optimum methods of culture may not reveal small numbers of bacteria this notion cannot be directly proved or disproved. Its validity depends on the assumption that pathogenic microbes remain dormant in the tissues for a remarkably long time not only in initially infected wounds but in sterile wounds as well. Moreover, to insist that all the bacteria found in a wound at any stage entered it at the time of wounding is to discount the opportunities for infection that arise every time the wound is exposed for treatment or inspection, and to ignore the open reservoir of pathogenic bacteria demonstrable in the patients and staff of a hospital.

Wound Flora

On the other hand, the view that the source of the infection is in the hospital environment is supported by the results of the study of wound flora. Change in flora takes place with remarkable frequency. The microbes most commonly cultivated in the later stages of wound treatment are *Staph. aureus* and *Strep. pyogenes*. There is no general bacteriological evidence, comparable to that advanced, for example, in the case of tetanus, that these two organisms lie dormant in the body tissues for long periods. In fact, in those instances of streptococcal and staphylococcal disease in which the time of infection can be ascertained both organisms are rapidly established in the tissues and demonstrable therein by routine bacteriological methods. Moreover, the hospital origin of these two organisms is made more likely by their known prevalence in the environment of the wounds, for potentially pathogenic staphylococci and streptococci are commonly found in noses and throats, on the skin, and in dust.

The evidence of infection from the hospital environment is particularly strong in the case of haemolytic streptococci. Griffith in 1935 described twenty-seven distinct serological types, which included most of those responsible for infection of the human subject, and the number has since been increased. Surveys of the haemolytic streptococci in the throats of patients on admission to hospital wards show that any one type is seldom found in more than one or two patients. If streptococci appear, for example, in a wound after its handling by a person with

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streptococcal sore throat the inference of hospital infection may be made with greater confidence if the two streptococci are found to be of the same type. The haemolytic streptococci may also be classified in groups, labelled A to K, by the Lancefield–Hare precipitin technique. Most of Griffith's numbered types fall into Group A, and a few into Groups C and G. A haemolytic streptococcus which does not belong to a recognized type may at all events be characterized by its Lancefield group. For epidemiological purposes two streptococci of the same *type* are assumed to be identical. This assumption, however, cannot be made of two streptococci of the same group, which may include several serological subtypes.

(We are greatly indebted to Dr. F. Griffith and Dr. Dora Colebrook of the Medical Research Council's Research Laboratory for Streptococcal Infections for the typing of the large numbers of streptococcal strains isolated in the course of this work. Without this collaboration the tracing of hospital infection would have lost a great deal of its force and precision.)

There is good evidence not only that hospital infection of war wounds occurs and that ample reservoirs of infection exist in the hospital environment, but that lapses in routine prophylaxis whereby pathogenic bacteria might enter a wound are not infrequent in surgical treatment. Sometimes the routine measures adopted are insufficient for prophylaxis against such infection, and sometimes an adequate routine is inadequately observed, especially by partly trained personnel. It is the object of this paper to relate recent surgical experiences which strongly indicate that the usual routine precautions taken were inadequate, and to suggest modifications of the prophylactic routine of wound treatment. Some of the suggestions might profitably be adopted on the strength of our present knowledge. Others are made tentatively; and it is hoped as a result that surgeons and bacteriologists will collaborate in establishing the mechanisms and extent of hospital infection of wounds and in devising methods of reducing them.

Examples of Presumed Hospital Infection of Wounds

Hospital infection may be presumed from the appearance of pathogenic bacteria in wounds previously free from them, particularly if the bacterium appears some time after the infliction of the wound. Our evidence, based primarily on the demonstration of additions to the bacterial flora of wounds, falls under three main headings:

1. *Comparison of Wound Flora in Groups of Wounds at Different Stages of Treatment.*—For example, Stokes and Tytler (1918–19) found a rise in the incidence of haemolytic streptococci from 14.8% in wounds before operation to 34.6% in wounds four to fourteen days after operation; Fleming and Porteus (1919) demonstrated a similar rise from 15% in recently inflicted wounds to more than 90% in wounds at base hospitals in France.

2. *Additions to flora in individual wounds sampled at intervals.*

3. *Additions to Wound Flora, with Evidence of a Spread of Infection among a Group of Wounded Persons.*—The demonstration of one type of bacterium in several wounds may, of course, be fortuitous, and though it offers evidence of hospital infection it does not necessarily imply infection from a common source or spread from wound to wound. If, however, the bacterium is rare or, better still, if its distribution in the hospital is known at the time of the outbreak, the evidence for spread of infection may be very strong. The readily distinguished thirty types of haemolytic streptococci are admirable "indicator" organisms for investigation of spread of infection. They are common secondary infectors, and their reservoirs—wounds themselves and the upper respiratory tracts of patients and personnel—may be kept under constant survey by periodic swabbing. Our strongest evidence of spread of infection comes from wards in which such a survey was maintained.

Comparison of Initial Wound Flora in Different Groups of Wounded

The bacteria present in wounds include both the pathogenic and the traditionally non-pathogenic. An analysis of gunshot, shrapnel, and air-raid casualty wounds gave the distribution of organisms recorded in Table I. Haemolytic streptococci, *Staph. aureus*, and micrococci, coliform bacilli, and spore-bearers are commonest. The percentages take no account of the relative predominance of the various organisms in wounds with a mixed flora, but diphtheroids, aerobic spore-bearers, *Cl. sporogenes*, and *Cl. septique* were present only in small numbers. The lower frequency of haemolytic streptococci, coliform bacilli, and bacteria of the gas-gangrene group in air-raid casualty wounds is striking. It may be due to the greater time-lag in admission to hospital of the military casualties and to the more immediate treatment of the air-raid casualties in casualty hospitals. The date of wounding is not known for a number of the military casualties recorded in Table I, but the average time-lag was certainly greater than that in the air-raid casualties. The analysis in Table II strongly suggests that *Strep. pyogenes*, *Staph. aureus*, and *Ps. pyocyanea* were commonly added to wounds in the course of treatment before admission to hospital. The percentage frequency of various bacterial species in admission swabs of thirty-seven soldiers and seventy-eight air-raid casualties

TABLE I.—*Wound Flora from Swabs taken on Admission to Advanced Base Hospitals in a London Sector*

Type of Bacterium	Percentage Occurrence in		
	105 Dunkirk Wounds	49 Air-raid Casualty Wounds	Total Wounds (154)
Streptococci : haemolytic	31.4	14.3	25.3
,, viridans and non-haem.	18.1	6.1	13.9
Staphylococci : aureus	54.3	55.1	53.3
,, albus, micrococci, etc.	19.0	40.8	25.4
G.-negative cocci	1.0	2.0	1.3
Diphtheroids	7.6	18.4	10.8
G.-negative bacilli : coliforms	24.7	14.3	20.8
Proteus	6.7	6.1	6.3
Ps. pyocyanea	7.6	6.1	7.0
Haemophilus	1.0	0.0	0.6
Spore-bearers : aerobic	14.3	16.3	14.5
Cl. welchii	22.8	4.1	16.4
Cl. sporogenes	10.5	4.1	8.2
Cl. septique	3.8	0.0	2.5
Other Clostridia	4.7	8.2	5.2
Sterile	11.4	4.1	8.8

TABLE II.—*Percentage Frequency of Bacteria in First Swab of Wounds, arranged According to Lapse of Time between Infection of Wound and Swabbing*

Type of Bacterium	Lapse of Days between Wounding and Swabbing		
	1–3	4–12	13–40
Streptococci : haemolytic	8.7	18.5	20.0
,, viridans and non-haem.	15.3	5.5	6.7
Staphylococci : aureus	39.3	50.0	86.5
,, albus, micrococci, etc.	65.5	35.2	6.7
G.-negative cocci	2.2	0.0	0.0
Diphtheroids	15.3	11.1	33.4
G.-negative bacilli : coliforms	28.3	13.0	26.7
Proteus	4.3	1.8	0.0
Ps. pyocyanea	0.0	7.4	20.0
Haemophilus	2.2	0.0	0.0
Spore-bearers : aerobic	47.8	14.8	6.7
Cl. welchii	34.7	11.1	0.0
Cl. sporogenes	6.5	0.0	0.0
Cl. septique	2.2	0.0	0.0
Other Clostridia	8.7	7.4	0.0
Sterile	8.7	11.1	0.0
No. of wounds in each group	46	54	15

is entered in three columns, according to the lapse of time between wounding and swabbing. The 115 wounds are selected only in that none was enclosed in plaster, and the time of wounding in each case was accurately known. The air-raid wounds had mostly been treated by excision, suture, and in some cases by chemotherapy. The military wounds had been treated only at field ambulances and advanced casualty clearing stations. In the early swabs *Staph. albus*, and micrococci, aerobic spore-bearers, *Staph. aureus*, *Cl. welchii*, and coliform bacilli predominate. In the later swabs the frequency of all but the coliform bacilli and *Staph. aureus* declines sharply. Those of low frequency in the early swabs also decline, excepting *Strep. pyogenes*, *diphtheroids*, and *Ps. pyocyanea*. Even if the percentage values in the "13–40 days" column, derived from fifteen wounds only, are set aside as inconclusive the figures suggest that *Strep. pyogenes*, *Staph. aureus*, and *Ps. pyocyanea* are added to wounds some time after their infliction.

Wound Flora Apparently Acquired in Hospital

(*a*) Twenty representative wounds in troops, mainly gunshot and shrapnel-inflicted in Belgium and France, were followed bacteriologically by means of weekly swabs from the time of operation at a London sector hospital to the time of healing. One wound was initially sterile. The rest were infected at the time of admission—8 with *Staph. aureus*, 7 with anaerobes, 3 with *Strep. pyogenes*, 3 with micrococci, 2 with coliform bacilli, and 1 each with an aerobic spore-bearer and *Ps. pyocyanea*. Seventeen of the 20 became infected with additional bacteria, and commonly with more than one additional species. The frequency with which the additional organisms appeared in the 17 cases was: *Staph. aureus* 9, *Strep. pyogenes* 8, aerobic spore-bearers 3, *Ps. pyocyanea*, non-haemolytic streptococci, micrococci, and diphtheroids 2 each, and anaerobic spore-bearers and coliform bacilli once each. As noted above, the two most frequent of these secondary invaders, the streptococci and staphylococci, are organisms commonly carried in the human upper respiratory tract. The additional bacteria appeared between three and twenty-seven days after the initial swabbing, and in 7 cases the appearance was accompanied by local and constitutional signs of infection. In these 7 cases the additional organism was *Strep. pyogenes* 3, *Staph. aureus* 3, and *Ps. pyocyanea* 1.

(*b*) Thirty air-raid wounds, mainly of the head, were similarly investigated. One was sterile, the remainder were infected chiefly with *Staph. aureus* and micrococci. Three were infected with *Strep. pyogenes* and 2 with *Cl. welchii* (without signs of gas gangrene). Additional bacteria appeared in 10, between three and eighteen days after the initial swabbing; again the bacteria added to a single wound often belonged to more than one species. Their frequency was micrococci 5, *Strep. pyogenes* 4, diphtheroids and coliforms 3 each, *Staph. aureus* 2, aerobic spore-bearers and *Strep. viridans* 1 each.

(*c*) Wounds treated by the closed-plaster method.—The flora at successive plaster changes was observed in 24 cases (15 at one hospital, 9 at another). All were initially infected. Three were swabbed at six, 2 at four, 6 at three, and 13 at two plaster changes. Of these 24 wounds, 16 showed additional flora. The number of new species acquired was in general greater the longer the plasters were observed. Six wounds acquired one new species, 4 acquired two, 1 acquired three, and 3 acquired four. For example, in one of the three wounds observed at six plaster changes, originally infected with *Staph. aureus*, *Ps. pyocyanea* appeared after thirteen days and Proteus and a Group C streptococcus after twenty-six days. Another was originally infected with *Staph. aureus* and a Type 27 streptococcus. After twenty-eight days the Type 27 streptococcus had gone and Proteus and a Type 1 streptococcus appeared. After thirty-three days *Bact. coli* and *Cl. welchii* appeared. The gradual addition of five and six new species was observed in two patients. The added organisms and their frequencies were: diphtheroids 8; *Strep. pyogenes* 6; *Proteus vulgaris* and *Ps. pyocyanea* 5; coliforms, *Cl. welchii*, and *Staph. albus* 3; enterococci, *Staph. aureus*, and aerobic spore-bearers 2; and *Strep. viridans* 1. *Strep. pyogenes*, whether initially present or added, usually persisted in the wounds beneath plaster, even though the other organisms died out. It was sometimes obtained in pure culture from a nearly healed wound. It disappeared from only 3 of 26 plaster wounds so infected.

The results under (*a*), (*b*), and (*c*) are representative of a much larger series of observations as yet incomplete. They show that of seventy-four wounds subjected to serial swabbing during their treatment in hospital forty-three (58%) apparently acquired new infecting bacteria. The new species appeared on the average about ten days after the first swabbing in hospital, and on the average about fifteen days after the infection of the wound.

Acquired Wound Flora with Evidence of a Spread of Additional Infection

(*a*) INFECTION BY AN ATYPICAL PROTEUS

In one ward an unusual atypical Proteus appeared in three plasters on July 27 and August 5, 1940. The patients concerned had on several occasions in the preceding three months been removed to the theatre for plaster changes, and in view of the fact that most of the plasters in this ward were removed in the ward itself it is probably significant that all these three plasters were changed on the same day—June 6, 1940.

(*b*) INFECTION BY UNUSUAL TYPES OF HAEMOLYTIC STREPTOCOCCI

Type B 3264 was obtained on October 1, 1940, from an abscess in the patient AJ. Three days later JB, a patient five yards across the gangway from AJ, yielded the same streptococcus from a slowly healing purulent wound of the leg that was being treated by exposure to the air of the ward. It was also obtained ten days later from a wound in the same ward treated in a closed plaster.

Type 28/11 (i.e., agglutinating with sera of both Type 28 and Type 11) was isolated from an abscess of the cheek in patient B. O'R, in the next bed, was moved two days later to another ward, where, after an interval of two days, she developed an acute Type 28/11 tonsillitis.

(*c*) WARD INFECTIONS BY TYPED HAEMOLYTIC STREPTOCOCCI WHOSE DISTRIBUTION WAS KNOWN

Strep. pyogenes was recovered from the wounds of 11 men in two interconnecting thirty-three-bed wards containing part of a Dunkirk convoy. In 8 the infection was apparently acquired in the hospital. There was one group of 5 infected with a Type 27 streptococcus. The weekly swabbing results were as follows:

JA. Bed 29, Ward 8. Wound Swabs

2/6/40:	Strep. faecalis, Staph. aureus
10/6/40:	" " *Strep. 27*, aerobic spore-bearer
24/6/40:	" " "
1/7/40:	" " "
8/7/40:	" "

JS. Bed 32, Ward 8. Wound Swabs

2/6/40:	Cl. sporogenes, micrococci, Strep Group C, Ps. pyocyanea, Staph. aureus, Bact. coli
10/6/40:	" " " *Strep. 27*
24/6/40:	" " " "
1/7/40:	" " " "
8/7/40:	" " " "
15/7/40:	" " " "
25/7/40:	" " " "

DI. Bed 34, Ward 8. Wound Swabs

2/6/40:	Bact. coli, Ps. pyocyanea
5/6/40:	Bact. alkaligenes, Bact. aerogenes
12/6/40:	Bact. aerogenes, Ps. pyocyanea, *Strep. 27*
25/6/40:	"
1/7/40:	"
8/7/40:	"
15/7/40:	"
22/7/40:	"

BB. Bed 11, Ward 8. Wound Swabs

(The first swab was taken three weeks after admission. No direct evidence of a hospital infection.)

26/6/40 : *Strep. 27*
1/7/40 : „
8/7/40 : „
15/7/40 : „

JM. Bed 66. Ward 9. Wound Swabs

10/6/40 : Non-haemolytic strep., Staph. aureus
26/6/40 : *Strep. 27*
1/7/40 : „ Ps. pyocyanea
4/7/40 : „ „
7/7/40 : „ „
15/7/40 : „ „
22/7/40 : „ „

YB. Bed 9, Ward 8. Wound Swabs

5/6/40 : *Strep. 4*, Staph. aureus, diphtheroid
24/6/40 : „ „ „
1/7/40 : „ „ „ diphtheroid
8/7/40 : „ „

WT. Bed 8, Ward 8. Wound Swabs

1/6/40 : Cl. sporogenes, Cl. welchii
5/6/40 : „ Staph. aureus
12/6/40 : „ „ „ *Strep. 4*
24/6/40 : „ „

FM. Bed 4, Ward 8. Throat Swabs

18/6/40 : No haemolytic streptococci
25/6/40 : *Strep. 4*
2/7/40 : No haemolytic streptococci

The beds of the first three patients were close together, and the fourth only 24 feet from Bed 29, diagonally across the ward. The bed proximity associated with an outbreak of *Strep. pyogenes* infection is reminiscent of outbreaks of streptococcal infections investigated in oto-laryngeal wards by Okell and Elliott (1936) and in children's wards by Wright (1940). At the time of the outbreak no other Type 27 streptococcus was isolated from the wounds in the two wards. Nor, with three exceptions, was it found in the throats of the nurses or men from June 18 to September 3. The three exceptions were the patient BB himself, whose throat harboured Type 27 on July 2, the patient OJ, and Nurse W.

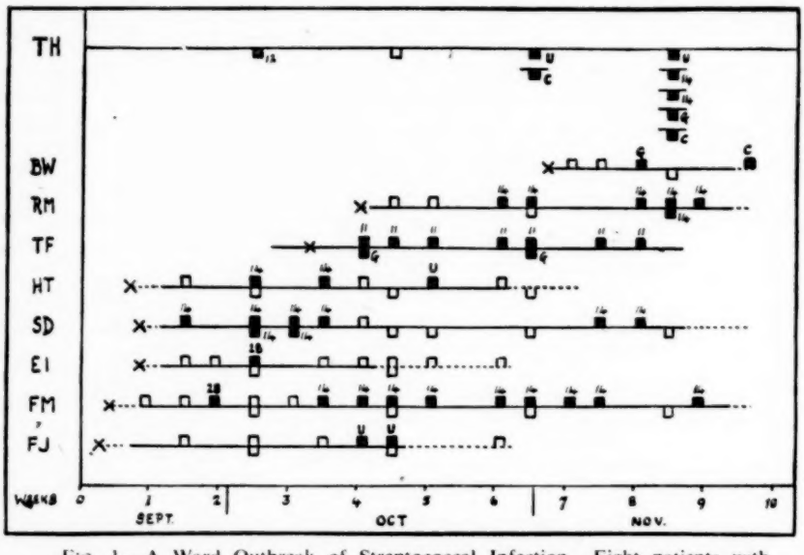

FIG. 1.—A Ward Outbreak of Streptococcal Infection. Eight patients with streptococcal wounds are entered in order of their date of admission. Seven were air-raid casualties, and × marks the date of wounding; TF underwent a "clean" operation; × marks the date of operation. The continuous line marks the date of admission to the date of discharge, death, or transfer to other wards. A square above the line represents a wound swab; below the line, a throat swab. A white square: no haemolytic streptococci isolated (swab not necessarily sterile). A black square: a haemolytic streptococcus isolated; a number refers to its Griffith type, a letter to its Lancefield group. U (untypable) = Lancefield A, not any known Griffith type. On the "TH" line are recorded any positive throat cultures at the date indicated in nursing, theatre, and surgical staffs and in the remainder of the patients in the ward.

OJ. Bed 51, Ward 9. Throat Swabs

18/6/40 : No haemolytic streptococci
25/6/40 : One colony *Strep. 27*
2/7/40 : No haemolytic streptococci
9/7/40 : A few colonies Strep. 27

OJ appears to have been a carrier of small amounts of Type 27, and may have been the source of all five Type 27 wound infections, including the case in Bed 66 of the interconnecting Ward 9. The five men had one other feature in common—namely, that they went to the operation theatre on the same day, June 2. However, the same may be said of nearly half the occupants of the sixty-six beds in the two wards, and there is no evidence that the men were operated on in one batch. It is noteworthy that in three instances Strep. 27 was accompanied by *Ps. pyocyanea*; the two may have been transmitted together. It is possible that Nurse W acquired a Strep. 27 during this outbreak in Ward 9. She had a sore throat from July 29 to August 5, 1940, and on August 1 throat swabs yielded abundant Strep. 27.

Strep. 4 was found in two wounds and one throat, as follows:

In both these groups the suggestion of hospital infection is strong, though the presumptive source could not be traced.

Another patient on June 1 had his arm amputated for a compound fracture wound containing *Cl. welchii* and *Bact. coli*. On June 18 a routine throat swab yielded a Type 11 streptococcus. On June 24 the amputation stump suppurated and the pus contained *Staph. aureus* and Strep. 11. The Strep. 11 had disappeared from the throat plates on July 7 and from the wound plates on July 8, but a blister on the foot treated by the patient with a penknife suppurated, and on July 15 yielded *Staph. aureus* and Strep. 11. Here in the absence of any Strep. 11 in the rest of the wards we may postulate an infection transferred from one site to another in the same patient.

In Fig. 1 are recorded the relevant features of another *Strep. pyogenes* outbreak. In this case the complete investigation of patients and of surgical and nursing staff was comparatively easy, owing to the small size of the ward and the maintenance of approximately the same nursing staff over the ten-weeks period concerned. The ward was a large room containing twelve male and eleven female beds, separated by a 12-ft. partition not reaching to the ceiling. All twenty-three beds were handled by one nursing unit. The patients were either air-raid casualties or "clean" cases in hospital for therapeutic operations. The streptococci spread mainly among the air-raid wounds. Of the eight patients infected with haemolytic streptococci only SD and TF yielded the organism at the first swab. BW's wounds yielded a Group G at the third and a Group C at the fourth sampling. The Group C presumably came from the patient's skin, which on admission yielded a Group C strain. TF's Strep. 11 appeared at the first dressing after a "clean" operation. No Type 11 was found in the ward or theatre staff. TF himself carried a Group G in the throat. The remaining five patients apparently acquired their streptococci in the ward. A

Type 28, a Group A streptococcus not belonging to any known type, and a Type 14 were implicated.

Type 28.—El and FM had this streptococcus for a short while. FM was at the time severely infected with *Staph. aureus, Bact. coli, Strep. viridans,* and an organism resembling *Proteus melanovogenes* (Miles and Halnan, 1937), and the Type 28 had no observable effect.

In El (and in FJ, see below) the appearance of the streptococcus sharply retarded the healing of an otherwise healthy wound containing only a little *Staph. aureus.*

Group A (U).—The untypable Group A infected FJ, and was responsible for the second of HT's hospital infections. There was no evidence of ill effect in HT. These two untypable A's are being investigated. If they prove to be serologically identical we might presume a cross-infection between HT and FJ, whose beds were only a few feet apart, for there were no other untypable A's in wounds or throats at the time.

Type 14.—SD first yielded Type 14 from a slowly healing wounded ear and from the throat. Subsequently, in the absence of any other demonstrable Type 14 in the ward, it appeared in HT, in FM as a *second* streptococcal infection, and in RM. SD was in the next bed to FM, and RM six feet away on the opposite side of the room. HT was the other side of the partition. Type 14 was not found again in SD's throat, but this patient was later infected by it, under the scab of a light wound that had healed over four weeks previously; the patient had been picking at the scab. FM's wound progressed very slowly, and required three operations in all. There is little doubt that the Type 14 infection was responsible for the delay and difficulties. RM's wound, initially infected with a few micrococci, healed slowly, but, considering the severity and situation of the wound and the presence of infected bone fragments, the delay could not unequivocally be attributed to the Type 14. Nevertheless the streptococcus constituted an unwelcome threat in an already serious situation.

But, whether the Type 14 proved to be deleterious or not, in the absence of any other demonstrable source of the organisms there can be little doubt that it spread through the ward and that the infection was carried from SD's throat or passed from wound to wound. Towards the end of the period the prevalence of Strep. 14 increased. At the routine swabbing on November 14 Strep. 14 appeared in three throats previously free from haemolytic streptococci. There were no signs of infection; three persons—two patients (including RM) and one nurse—thus became clinically undetectable reservoirs of Strep. 14.

(*d*) THEATRE INFECTION BY TYPABLE HAEMOLYTIC STREPTOCOCCI

In an E.M.S. theatre two patients, Mrs. A and Sergeant B, both clean cases, were operated upon on the same day, in the same theatre, and by the same team. The operations were the first and second on the morning of July 18, 1940, and were left cervical sympathectomy and repair of left brachial plexus respectively. Four days later Sergeant B's incision suppurated, and yielded a Type 11 streptococcus. A shallow ulcer eventually formed, which healed early in September. Five days after operation Mrs. A's incision broke down, and the pus contained Strep. 11. The patient became rapidly worse, and died a few days later from secondary haemorrhage from the subclavian artery. Throat swabs of all the theatre staff present on July 18 showed that one nurse was an abundant carrier of Strep. 11. It seems probable that she was the source of infection because, although there were other cases of Strep. 11 infection in the hospital at the same time, there was no discoverable association between these and the two patients, and no other source of infection was evident. The masks used in the operating theatre were too small to reach well under the chin, and consisted of two thicknesses of gauze with no interposed impervious material. The surgeon himself wore a large and impervious mask.

(The second half of the paper will appear in next week's issue, together with the list of references.)

CEREBROSPINAL MENINGITIS

THE USE OF SULPHONAMIDE DERIVATIVES IN PROPHYLAXIS

BY

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The increased prevalence of cerebrospinal meningitis during wartime conditions has long been recognized, and the present war has proved no exception to the general rule.

The use of sulphonamide derivatives in treatment has brought about a marked decrease in the mortality rate, a shortening of the duration of the disease, and a great reduction in the incidence of sequelae. The application of these drugs to the prophylaxis of the disease has not, however, been so successful, and there is still no generally accepted routine procedure for the management of contacts. General measures, such as the swabbing and segregation of contacts, are usually employed, but have proved of doubtful value.

During the outbreak an opportunity was afforded of investigating a number of cases and of studying the effect of intensive sulphonamide therapy on the presence of the meningococcus in the nasopharyngeal mucosa. The results are given in two sections, the first dealing with the cases of cerebrospinal meningitis and the second with problems of prophylaxis.

Technique of the Investigation

Cerebrospinal Fluid.—Samples of cerebrospinal fluid were examined as soon after collection as possible. The deposit after centrifuging for five minutes was inoculated on to blood-agar and boiled-blood-agar plates and Loeffler's serum slopes; films were then made and 5 to 10 c.cm. of glucose broth was added to the remaining deposit. The cultures were incubated at 37° C. and examined daily for seven days. When growth was obtained subcultures were prepared on Loeffler's serum slopes; after twenty-four hours' incubation the subculture was suspended in normal saline, and macroscopic agglutination was carried out at 55° C. with Groups 1 and 2 sera. In a few instances the strains were kindly typed by Dr. W. M. Scott, Types 1 and 3 being identified. The films were stained by Gram's method and also by the technique recommended by Sandiford (1937) for urethral smears from cases of gonorrhoea.

Nasopharyngeal Swabs.—Material was collected from the nasopharynx by means of the West swab and cultured on blood agar. Boiled-blood-agar plates were also used originally, but as they invariably gave results similar to those from the blood-agar plates their use was discontinued. After incubation for twenty-four hours a close examination was made and suspicious colonies were subcultured on to Loeffler's serum slopes. If meningococci were not isolated the original plates were re-examined after incubation for a further twenty-four hours.

Only organisms agglutinating with one or other of the group sera were accepted as meningococci. The characteristic sugar reactions—that is, acid production in glucose and maltose but not in sucrose—were usually but not invariably given by the strains. While so-called inagglutinable strains have been reported by many workers it was considered that criteria other than serological tests were too unreliable for the differentiation of the meningococcus from other *Neisseria.* Wilson (1928), in an investigation of the *Neisseria,* found a considerable amount of

variability in Gram-negative cocci isolated from the nasopharynx, and considered that the classification of the organisms on the basis of colonial appearance was open to serious objections.

(A) Analysis of 51 Cases of Cerebrospinal Meningitis

Fifty-one cases of this condition have been investigated in various parts of the East and West Lancashire areas of the Western Command. These cases have all been sporadic, and it would appear that there is little justification for the general use of the term "epidemic" in connexion with this disease. Although in many instances conditions have been favourable for extensive local outbreaks, single cases have almost invariably been recorded. This is a usual feature of the disease, which is generally recognized as having a low morbidity rate, in contrast to such epidemic diseases as measles and influenza.

The *symptomatology* of the disease has been extremely variable. The commonest predominant features have been intense headache, neck rigidity, pyrexia, and vomiting. The onset, while usually sudden, has occasionally been slow and insidious. In a few cases in which vomiting has been pronounced the diagnosis has provisionally been one of acute appendicitis. The characteristic rash has been observed in several cases.

The *diagnosis* in all cases has been confirmed by an examination of the cerebrospinal fluid, which is purulent and often contains the causative organism. The meningococcus, however, may be neither seen nor cultivated, and occasionally when present in small numbers attempts at cultivation may be unsuccessful. This does not detract from the value of a lumbar puncture, which should be carried out in all suspected cases. Several patients have been seen with a clinical picture similar to that found in cerebrospinal meningitis, but the cerebrospinal fluid has been normal even on repeated examination; these cases have been kept under careful observation until a diagnosis has been established, and in no instance did meningitis develop. Cases of this kind in which a clinical diagnosis of cerebrospinal meningitis was not confirmed by lumbar puncture included such conditions as acute benign lymphocytic meningitis, sunstroke, frontal sinusitis, acute fibrositis of the neck, and even acute war neurosis.

The results obtained from the examination of fluids in the present series are given in Table I.

TABLE I.—*Isolation of Meningococci from the Cerebrospinal Fluid of Cases of Cerebrospinal Meningitis*

	No. of Cases	Group 1	Group 2	Not Tested
Meningococci isolated ..	23	21	0	2
,, not isolated ..	28	—	—	—
Total	51	21	0	2

Meningococci were isolated from only 23 out of 51 cases—i.e., 45%. In all instances, however, where serological tests were carried out (21 cases) the strains proved to be Group 1. This is in sharp contrast with the outbreak in 1915, in which Group 2 strains were commonly isolated. Organisms were not isolated in 55% of cases. These cases were undoubtedly cerebrospinal meningitis; in some a few organisms could be seen in films. The cerebrospinal fluid was usually collected within four days, often within two days, of the onset, but in the majority of cases intensive treatment with sulphanilamides or sulphapyridine had already been begun. This is probably an important factor in the failure to isolate meningococci, and emphasizes the need for early lumbar puncture, preferably before chemotherapy has been started.

Therapy in practically all cases was carried out on the lines recommended by Banks (1939) and the War Office Memorandum (1940)—that is, early massive doses of sulphanilamide or sulphapyridine, up to 10 grammes a day, for the first few days and the use of sulphapyridine soluble for fulminating cases or for cases in which the diagnosis had been delayed. The results have been highly satisfactory. The mortality rate has been low (less than 5%) and the incidence of sequelae slight.

(B) Problem of Prophylaxis

There is no generally accepted scheme for the control of cerebrospinal meningitis. It has been found that the meningococcus is well distributed in the general population and that the disease is spread almost entirely by carriers and not by actual cases of the disease. Control of the condition is therefore a difficult problem, and many methods have been advocated, the most widely employed being segregation and routine swabbing of contacts, with good ventilation and avoidance of overcrowding and fatigue, particularly in young recruits.

Value of Routine Swabbing

During the war of 1914–18 a considerable amount of research was carried out on various problems connected with cerebrospinal meningitis. Glover (1920) found that there was a definite relation between the incidence of the disease and the carrier rate of the population. An increase in the carrier rate over 20% was the warning signal for an outbreak of cerebrospinal meningitis. Glover (1918) also considered that overcrowding in sleeping quarters was a particularly important factor in the spread of the disease. Thus when the beds in barracks were placed more than two and a half feet apart there was a considerable reduction in the incidence of the disease. Emphasis was consequently laid on the swabbing of contacts and avoidance of overcrowding, particularly in barracks.

Dudley and Brennan (1934), however, were unable to correlate a high carrier rate in the population with an increased incidence of cerebrospinal meningitis. They found during an investigation at Chatham Naval Hospital a carrier rate of 13% with 11 cases of cerebrospinal meningitis; while later, over a period of some ten months, the carrier rate became 55% and yet no cases of meningitis developed.

Routine swabbing is now being viewed with disfavour as the results obtained hardly merit the labour involved. At the beginning of the war only "close-contacts" had to be swabbed—close-contacts being persons occupying adjacent beds or sharing the same billet or tent. This procedure has been carried out in all cases and 135 close-contacts have been examined. The results are given in Table II, together with those from a control group of patients in the hospital—usually cases of fracture, dyspepsia, or similar conditions—during the same period.

TABLE II.—*Incidence of Meningococci in Contacts and Non-contacts*

	No. Examined	No. Positive	Group 1 Strains	Group 2 Strains
Close-contacts	135	22 (16%)	6 (4%)	16 (12%)
Control group (non-contacts)	154	33 (21%)	5 (3%)	28 (18%)

There is little difference in the figures given by the two groups—the carrier rates being 16% for the close-contacts and 21% for the non-contacts. There was, however, a slightly increased proportion of Group 1 carriers in the close-contacts. In no instance did cerebrospinal meningitis develop in any of these individuals.

These results indicate that the swabbing of persons occupying beds adjacent to cases and the segregation of carriers do not serve any useful purpose as a routine procedure. Such a practice tends to give a feeling of false security, considering the wide distribution of the meningococcus in the community. Moreover, there is little justification for the assumption that only persons sleeping next to patients should be treated as close-contacts. It is highly probable that other persons, particularly those associated with cases during meal-times and recreational activities, might actually constitute closer contacts during the incubation period and early stages of the disease, when the organism is believed to be multiplying in the nasopharynx, and so be more liable to infection. Thus while a number of carriers are identified as a result of the swabbing of close-contacts, many others escape detection and continue to disseminate the organisms. Consequently unless swabbing is complete—and this is impracticable except in closed communities—it is without value.

Value of Sulphonamide Derivatives in Prophylaxis

The outstanding success obtained by sulphonamide drugs in the treatment of cerebrospinal meningitis has directed attention to their value in the treatment of carriers. Nothing of a definite nature has, however, been determined about this important question. Investigations were consequently carried out to obtain information about the presence of meningococci in nasopharyngeal swabs from: (1) persons under intensive treatment with sulphapyridine; (2) convalescent and recovered meningitis cases; (3) carriers after therapy with sulphapyridine.

1. *Persons under Intensive Treatment with Sulphapyridine.*—During the period March to September, 1940, a series of nasopharyngeal swabs were collected from patients in the hospital undergoing intensive chemotherapy for gonorrhoea. The swabs were usually obtained immediately after the first course of sulphapyridine (some 22 grammes): in a few cases as much as 60 to 80 grammes had been given before the swabs were taken. During the same period swabs have also been taken from other patients in the hospital who have not been receiving chemotherapy. The swabs have generally been collected in groups of four or five in order that each could receive adequate attention. The results are given in Table III along with those obtained from the close-contacts of cases of cerebrospinal meningitis (Table II above).

TABLE III.—*Isolation of the Meningococcus from the Nasopharynx of Individuals receiving and those not receiving Intensive Sulphonamide Treatment*

Cases	No. Examined	No. Positive	Group 1	Group 2
Treated with sulphapyridine ..	139	1	0	1
Close-contacts (not treated) ..	135	22	6	16
Control group (non-contacts)	154	33	5	28

There is a great contrast between the results given by patients receiving chemotherapy and those given by the other groups; in the former only one individual out of 139 gave a growth of a meningococcus; in the latter 55 out of 289 gave a positive result. It is interesting to note that pneumococci and *Strept. haemolyticus* were not infrequently isolated from the former group. It has been tentatively suggested, on evidence of a doubtful nature, that as there is a generic relationship between the meningococcus and the gonococcus some cross-immunity may exist between these organisms. Dudley and Brennan (1934), however, found a meningococcus carrier rate of 48% among 50 cases of gonorrhoea examined. The probability that the failure to isolate meningococci from treated gonorrhoea cases was due to the presence of some cross-immunity can therefore be excluded. It appears to be the direct result of the administration of the sulphapyridine.

2. *Convalescent and Recovered Meningitis Cases.*—A group of 14 recovered cases of cerebrospinal meningitis were examined at periods varying from 17 to 76 days from the onset of symptoms; in 9 cases the period was less than 40 days. In each case chemotherapy had been successfully applied. Meningococci were not isolated in any instance. This observation, while of little value in itself, provides some evidence to support the view that intensive treatment with drugs of the sulphonamide series is a satisfactory means of removing the meningococcus from the nasopharyngeal mucosa. It is generally accepted that the meningococcus produces a primary infection in the nasopharynx and that in some of these cases spread of the infection to the meninges takes place. Consequently in cases of cerebrospinal meningitis the causative organism can usually be isolated from nasopharyngeal swabs taken in the early stages of the disease. The meningococcus also tends to persist in this region during convalescence: Embleton and Steven (1919) found that every one of 86 cases of cerebrospinal meningitis investigated became a chronic carrier, with an average carrying period of six months. These figures form a sharp contrast to those given above.

3. *Carriers after Sulphapyridine Therapy.*—An attempt was next made to obtain more direct evidence of the value of sulphapyridine as a means of eliminating meningococci from the nasopharyngeal mucosa. Persons who had been found to harbour the meningococcus were segregated and given an intensive course of chemotherapy with sulphapyridine—4 grammes on the first and second days and 3 grammes on the third and fourth days. Nasopharyngeal swabs were collected before and after such treatment; the results are shown in Table IV.

TABLE IV.—*Treatment of Carriers of Meningococcus with Sulphapyridine*

	No. Examined	No. Positive	Group 1	Group 2
Before treatment	13	13	4	9
After ,, ...	13	0	0	0

While these figures, like those in the previous section dealing with recovered cases, are small, they provide further evidence to support the view that adequate treatment with sulphapyridine or allied drugs is a satisfactory method of clearing meningococci from the nasopharyngeal mucosa. In many instances the cultures prepared before chemotherapy gave an almost pure growth of the meningococcus.

Discussion

The epidemiology of cerebrospinal meningitis is a complex problem involving a close consideration of two main factors—namely, the virulence of the meningococcus and the resistance offered by the host.

The virulence of the meningococcus is difficult to assess as there is no laboratory animal in which virulence tests can be satisfactorily carried out. It is therefore necessary to depend on indirect evidence. Results obtained from the recent outbreak indicate unequivocally that Group 1 strains are at the present time more virulent than Group 2 meningococci. All identified strains from cases of cerebrospinal meningitis recorded here have been Group 1, and this appears to have been the usual finding in other parts of the country. As, however, Group 2 strains have produced meningitis in former outbreaks it cannot be assumed that

they are now permanently avirulent for man and are consequently of no epidemiological significance.

Fluctuations undoubtedly occur in the virulence and invasiveness of the meningococci. Maclean and Bevan (1939), investigating an extensive outbreak in Cyprus, obtained clinical evidence that suggested an increase in virulence of the meningococcus as a result of frequent passage from man to man. They recorded many instances of the rapid transfer of catarrh inside family circles, while only the last victims of the common infection developed meningitis. They did not, however, obtain any bacteriological confirmation of these observations.

It is consequently impossible to give any final opinion about the virulence of Group 1 and Group 2 meningococci, but there is no doubt that at the present time Group 2 strains are relatively avirulent and have a low invasive power. It is possible that changes may take place in meningococci analogous to those found in *H. pertussis*, where virulence progressively decreases from Phase I to Phase IV. It is interesting to note that while Group 1 strains isolated from cases of cerebrospinal meningitis usually gave clear-cut agglutination with little cross-reaction with Group 2 sera, strains isolated from carriers (mainly Group 2) frequently exhibited marked overlapping with the two group sera. Strains isolated from actual cases tended to show greater group specificity than strains isolated from carriers.

The spread of the meningococcus in the community is by droplet infection, and such factors as poor ventilation and overcrowding undoubtedly play an important part in the dissemination of the organism. They do not, however, appear to play a primary part in the development of the disease. Several of the 51 cases here recorded were associated with serious overcrowding; yet in no instance did a second case of cerebrospinal meningitis develop, in spite of the fact that such cases had often not been isolated for some twenty-four hours after the onset of the disease. A carrier rate of 21% was, moreover, found in the patients of the hospital; these were living under ideal conditions, with good ventilation and no overcrowding, the distance between adjacent beds being at least four feet. The organisms isolated, however, generally proved to be the relatively avirulent Group 2 strains.

During this investigation it has been repeatedly found that fatigue has been a contributing factor in the development of the disease. It is a common experience that the disease is found most commonly in young recruits and, under wartime conditions, vigorous training is started early, often in individuals unaccustomed to violent exercise. As a result resistance to infection is lowered rather than increased. The importance of overcrowding as a factor in the development of cerebrospinal meningitis appears to have been exaggerated, to the neglect of such factors as fatigue, which tend to lower resistance to infection.

The meningococcus is widely distributed in the community and, although the organism does not live naturally outside human tissues, its complete elimination is impossible. Swabbing is consequently of little value except in special circumstances, such as when a persistent source of infection is present in a closed community or during an extensive localized outbreak, where all contacts can be swabbed and carriers segregated and treated. These points have been stressed in the recent War Office Memorandum on Cerebrospinal Fever (1940).

The use of sulphonamide drugs in the treatment of carriers is likely to have only a limited application, as their wholesale administration is impossible. When, however, swabbing has been carried out and carriers have been identified these drugs should prove of great value, since other methods of treating carriers have proved unreliable. The results recorded here indicate that in adequate dosage the administration of sulphapyridine is an effective and rapid method of removing meningococci from the nasopharyngeal mucosa.

Summary

Fifty-one cases of cerebrospinal meningitis have been investigated; the meningococcus has been isolated on twenty-three occasions and, where typed, has been Group 1.

Evidence has been obtained that adequate dosage with sulphapyridine is a satisfactory method of clearing meningococci from the nasopharyngeal mucosa.

I wish to thank the many persons—in particular Mr. C. W. Ashton, senior laboratory assistant—who have assisted in various ways during this investigation.

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ANALYSIS OF HAEMORRHAGIC STATES WITH SNAKE VENOM AND LECITHIN

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In numerous experiments in man and animals we have confirmed the observations of Trevan and Macfarlane (1936–7) that the coagulant action of Russell-viper venom on blood and plasma can be potentiated by the addition of lecithin. Leathes and Mellanby (1939) and Pratt (1940), working with solutions of prothrombin, have shown that the venom acts as a thrombokinase, converting prothrombin into thrombin in the presence of calcium, and they have clearly demonstrated the adjuvant action of lecithin.

Method Used

All the observations in this paper were made by substituting venom or venom plus lecithin for the brain extract used in Quick's prothrombin test (Quick, 1935):

Nine cubic centimetres of blood, withdrawn rapidly and with special precaution to avoid trauma, are promptly and thoroughly mixed with 1 c.cm. of M/10 sodium oxalate, and centrifuged at a low speed for five minutes. Of this plasma 0.1 c.cm. is transferred to a dry clean test-tube (13 × 100 mm.) in a water bath kept at 37° C., and mixed with 0.1 c.cm. of venom or venom plus lecithin. Without delay 0.1 c.cm. of M/40 calcium chloride is added, the tube quickly shaken, and the exact time required for the formation of a solid clot recorded.

Under the conditions of Quick's test the optimum amount of lecithin is about 5 mg. per c.cm. of venom (Hobson and Witts, 1940), and the figure remains very constant under various experimental conditions, in different animal species, and in different members of the same species. This concentration is obtained by adding 0.05 c.cm. of a 10% alcoholic solution of ovolecithin to every cubic centimetre of the solution of venom. Different batches of Russell-viper venom as purchased vary in coagulant power, but phials from the same batch are very constant.

The Investigation

Our observations were made with a single batch of venom, which was used in a dilution of 1 in 50,000—i.e., 0.1 mg. venom + 1 c.cm. of distilled water + 4 c.cm. of saline. The plasmas were from a random group of 43 normal and sick people, with a bias in favour of cases of haemorrhagic disease. In each case we measured the accelerated clotting time using venom alone and venom plus lecithin (see Table and Fig. 1).

Table of Cases, showing the Coagulation Time of Plasma in Seconds by Various Techniques

Sex and Age	Diagnosis	1/50,000 Venom	Venom + 5 mg. per c.cm. Lecithin	Lecithin Difference	Quick	Howell
		sec.	sec.	sec.	sec.	sec.
M. 27	Normal	20	10	10	19	110
M. 26	,,	24	11	13	19	90
M. 58	Arthritis	22	12	10	—	—
M. 43	,,	20	11	9	17	127
M. 51	Sciatica	20	9	11	—	—
M. 38	,,	23	11	12	—	—
M. 36	Tuberculous meningitis	19	13	6	16	—
M. 52	Pulmonary osteo-arthropathy	21	14	7	16	—
M. 63	Gastric ulcer	24	11	13	19	120
M. 25	Convalescent burns	20	11	9	—	—
F. 56	Epistaxis	20	11	9	19	80
F. 17	Ulcerative colitis	22	12	10	—	—
F. 49	Hypertension	15	11	4	16	—
M. 36	Traumatic injury of heart	13	10	3	—	—
F. 64	Coronary thrombosis	25	13	12	—	—
M. 53	Diabetes mellitus	18	12	6	—	—
M. 66	Prostatic hypertrophy	—	10	—	—	—
M. 39	Thyroidectomy	21	11	10	—	—
F. 29	Dysmenorrhoea	20	11	9	19	140
M. 59	Acromegaly	25	11	14	16	—
M. 40	Subacute combined degeneration	28	13	15	—	—
F. 70	Myelosclerosis	19	11	8	18	80
F. 58	Aplastic anaemia	25	12	13	—	—
F. 40	Nocturnal haemoglobinuria	20	9	11	—	—
F. 68	Pernicious anaemia	20	11	9	19	120
M. 60	Cirrhosis hepatis	—	14	—	—	—
F. 64	Obstructive jaundice	—	14	—	—	—
M. 45	,, ,,	24	14	10	29	110
F. 62	Treated jaundice	14	12	2	20	180
M. 5	Haemophilia	21	11	10	16	240
M. 2	,,	21	12	9	23	300
M. 6	,,	20	10	10	19	420
M. 37	,,	17	12	5	19	140
M. 1	,,	19	12	7	18	165
F. 29	Carrier of haemophilia	18	12	6	20	180
M. 5	Thrombocytopenia	22	11	11	19	180
M. 12	Fibrinopenia	25	11	14	20	195
F. 30	Thrombocytopenia	29	10	19	18	120
M. 12	,,	28	13	15	—	—
	The Den Family :					
M. 25	Albert (thrombasthenia)	29	12	17	—	—
M. 31	Arthur ,,	29	12	17	17	140
F. 10	Joan ,,	21	15	6	18	105
M. 5	Billy (no symptoms)	20	11	9	19	90

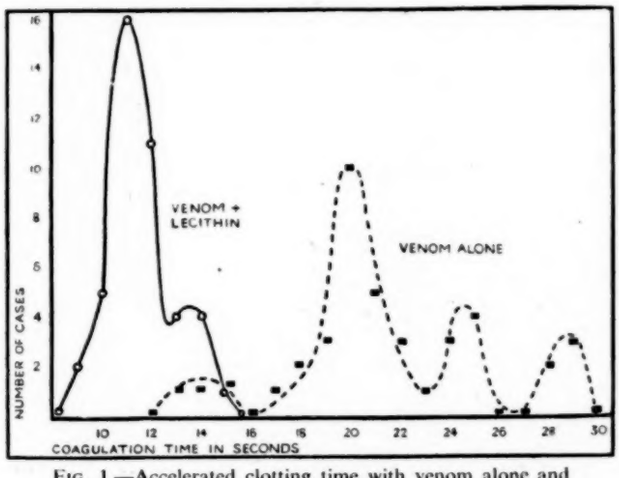

FIG. 1.—Accelerated clotting time with venom alone and venom plus lecithin.

The Den Family.—Affected members bleed readily from cuts and dental extractions and frequently from the nose. Coagulation time (Lee and White) is normal, bleeding time sometimes prolonged, platelets low normal, clot retraction indifferent, and fibrinogen normal.

Fibrinopenia.—This case—that of a boy aged 12—has presented symptoms very much like haemophilia, but the clotting time (Lee and White) is normal, as are the bleeding time and the platelets; clot retraction is poor and fibrinogen 142 mg. per 100 c.cm.

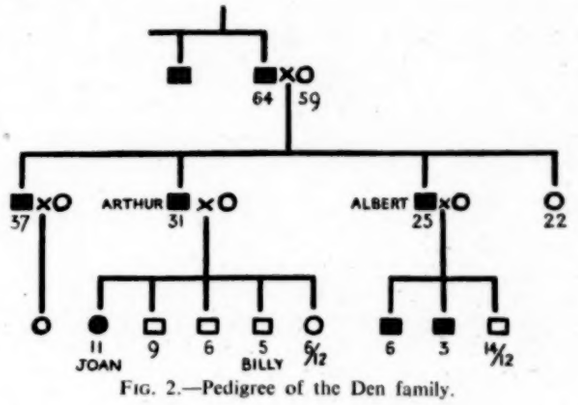

FIG. 2.—Pedigree of the Den family.

With venom alone the most frequent clotting time was 20 seconds; but the observations were widely scattered, and unusually long clotting times were noted in patients in whom Quick's test gave a normal result.

With venom plus lecithin clotting times were not only quicker but much less scattered. The usual time was 11 seconds. The frequency curve is of a bimodal type, and suggests a normal range of 9 to 13 seconds. The plasmas which gave values over 13 seconds came from cases of cirrhosis (14″), obstructive jaundice (14″ and 14″), thrombasthenia (15″), and pulmonary osteo-arthropathy (14″). High values were expected in disease of the liver, in which the amount of prothrombin in the plasma is reduced and the clotting times with Quick's reagent and venom plus lecithin run parallel. The high values in thrombasthenia and pulmonary osteo-arthropathy, which did not check with Quick's test, were only appreciated in retrospect and have not yet been explained.

The interval between the peaks of the two curves is 9 seconds. We call this difference between the clotting times with venom alone and venom plus lecithin the *lecithin difference*, as it is a measure of the adjuvant action of lecithin. The values for the lecithin difference are very scattered, and they obviously account for the irregularity of the results when venom alone is used. The usual lecithin difference is 9 or 10 seconds, but the figures range from 2 to 19 seconds. Our data are not sufficient to enable us to find rhyme or reason for small lecithin differences, but of the seven lecithin differences above 13 seconds two are in thrombocytopenic purpuras, two in a thrombasthenic family, one in a congenital haemorrhagic diathesis we have labelled "fibrinopenia," one in acromegaly, and one in subacute combined degeneration. The only other thrombocytopenia we have examined—not included in this series because only 2 mg. per c.cm. of lecithin was used—had a lecithin difference of 18 seconds. In our brief experience a high lecithin difference is not always found in a given case of haemorrhagic diathesis, and, like so many other phenomena in that puzzling group of diseases, it seems to vary with the intensity of the disorder.

Conclusion

Observations on the use of Russell-viper venom alone and venom plus lecithin as the clot-accelerating reagents in Quick's test suggest that this technique allows us to recognize three types of haemorrhagic tendency. In haemophilia the blood coagulates like that of normal people when snake venom is added. In purpura haemor-

rhagica and certain hereditary haemorrhagic states coagulation may be less rapid than normal when venom alone is used, but is not usually different from normal when venom and lecithin are added; the need for lecithin varies at different periods and may run parallel to the tendency to bleed. In prothrombin deficiency coagulation remains impaired despite the addition of venom plus lecithin. If venom is used instead of brain extract to measure prothrombin in the Quick test it must be fortified by the addition of lecithin; in other words, *venom (thrombokinase) + lecithin = tissue extract (thromboplastin).*

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POLYCYTHAEMIA AND VITAMIN C

BY

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Lurgan

For several years past it has been considered that vitamin C plays some part in the regulation of the number of red blood cells in the body. Dunlop and Scarborough (1935) showed that a rise in the red blood count, a decrease in the number of reticulocytes, and a rise in the haemoglobin percentage resulted when vitamin C was given to a patient suffering from scurvy, although the iron content of the diet (10 mg. daily) was not increased. On the other hand, Barron and Barron (1936) observed that vitamin C reduced the red blood count in animals suffering from artificially induced polycythaemia. Waltner and Waltner (1929) noted that this disease could be caused in animals by administering cobalt, which Mascherpa (1930) was able to demonstrate caused an increase in bone marrow activity in dogs. When they simultaneously injected cobalt sulphate and vitamin C intravenously (60 mg. daily) into rabbits Barron and Barron failed to observe any signs of polycythaemia, although this appeared a week after withdrawing the vitamin C.

When vitamin C was injected after the production of polycythaemia a decrease in the red cell count and the haemoglobin percentage resulted, although the effect was temporary. It was found that the percentage of haemoglobin ran parallel with the red blood count. This experimental polycythaemia is probably caused by the cobalt inhibiting the respiratory function of immature red blood cells, which are rapidly replaced in the bone marrow. Vitamin C functions as a regulator of the level of red cells in the circulating blood.

Barron and Barron (1936) produced polycythaemia in rabbits by the daily injection of 0.01 gramme of cobalt sulphate. Reticulocytes and erythroblasts appeared in the circulating blood and there was an increase in respiration of the red blood cells, although the latter was not observed in cases of human polycythaemia vera. The addition of cobalt sulphate to red cell suspensions from the blood of rabbits suffering from cobalt polycythaemia was followed by marked inhibition of respiration, in contrast with the absence of such an effect in similar suspensions prepared from the blood of normal rabbits. This inhibition of respiration was confined to immature red cells, being greater in the bone marrow cells than in the red cells of the kidney and spleen.

According to Barron one of the functions of vitamin C is to maintain the haemoglobin concentration in the blood at a normal level. This view is based on the following facts: (1) The fall in the percentage of haemoglobin in the early stages of scurvy occurs before clinical symptoms appear, and the haemoglobin returns to normal after the administration of vitamin C, before these symptoms disappear. (2) Cobalt polycythaemia in rabbits is prevented by giving vitamin C. It is also known that vitamin C reduces ferrihaemin to ferrohaemin, which when combined with globin yields haemoglobin. There is some evidence that the utilization of iron is defective when the reserves of vitamin C in the body are depleted (McCollum *et al.*, 1939). Neither large doses of iron nor the substance potent in pernicious anaemia are effective in the scorbutic state.

Kandel and LeRoy (1938) tried the effect of vitamin C on two patients suffering from polycythaemia vera, but reported that it had no influence whatsoever on the red blood count and the haemoglobin percentage.

Encouraged by Barron and Barron's results a study has been made of the vitamin C metabolism in two cases of polycythaemia. I decided to investigate the excretion of the vitamin, the amount necessary to saturate the patient, the result of giving large doses, and finally the effect of raising the threshold of vitamin C excretion by administering sodium bicarbonate.

Hawley *et al.* (1936) showed that the amount of vitamin C retained by the body depends upon factors other than the level of the vitamin already in the body. For example, when vitamin C is administered with ammonium chloride to persons already saturated with the vitamin almost 100% of a daily test dose is excreted. If, however, the same amount of vitamin C is given with sodium bicarbonate only 50% is excreted in the urine. Similar experiments with guinea-pigs showed that the administration of large doses of sodium bicarbonate permitted the storage of greater amounts of vitamin C in the adrenals and liver than when the vitamin was given alone or with ammonium chloride.

Dr. J. G. Keohane of Limavady, who had a case of polycythaemia under his care, carried out a similar investigation at my request.

Case Records before starting the Investigation

Case 1.—A fisherman aged 53. This patient was a strong well-built man whose only illness had been pneumonia ten years ago. About two years ago he began to feel a heaviness in the head, and suffered from headaches, lack of concentration, and vertigo. He had pains in his legs and was easily tired. His face became a deep purple colour, particularly so in the lips and cheeks. His eyeballs were bloodshot and the conjunctivae congested. He was admitted to the Royal Victoria Hospital on April 12, 1939, under Prof. W. W. D. Thompson. He then complained of pains in the head and chest and heaviness in the head. His complexion had become more purple. On examination his lips and the conjunctival surfaces of the eyelids were a deep crimson. The conjunctivae were injected and the skin of his body was redder than normal. His apex beat was in the sixth intercostal space, 4 inches from the midline. The blood pressure was 148/95. There were some crepitations at the base of the right lung. The temperature was normal.

The patient had an unhealthy mouth and his abdomen was distended. Palpation revealed a sausage-shaped tumour 4 by 1½ inches in the right iliac fossa. Neither liver nor spleen was palpable. The results of a blood examination were as follows: red cells, 6,290,000 per c.mm.; Hb (Haldane), 106%; colour index, 0.9; white cells, 10,000 per c.mm.; Wassermann negative. Nothing abnormal was found in the cerebrospinal fluid or urine. Cystoscopy and a barium enema also revealed nothing abnormal.

A diagnosis of polycythaemia was made. The patient was advised laparotomy, but refused. On April 19 venesection was performed and 500 c.cm. of blood withdrawn. Another

450 c.cm. of blood was withdrawn on May 10. The patient showed some improvement during his stay in hospital. The headaches and dizziness had gone, and the blood pressure and red cell count were down slightly (138/94 and 5,680,000). The percentage of haemoglobin remained unaltered (106%), and the colour index was 0.93. There was no change in the abdominal tumour.

Case 2.—Dr. Keohane's case. A woman aged 60, who had been ill for seven to eight months, was seen by Prof. W. W. D. Thompson on November 25, 1939. A blood examination made at that time gave: red cells, 6,420,000 per c.mm.; Hb (Haldane), 115%; colour index, 0.9; white cells, 5,700 per c.mm. The red blood cells were of normal size and shape, and the van den Bergh test was negative. The spleen was enlarged and the patient showed signs of arteriosclerosis. There was no evidence of leukaemia. No treatment for the polycythaemia was given before the investigation by Dr. Keohane.

Method of Investigation

The daily excretion of vitamin C in the urine was determined. Then 300 mg. of vitamin C (6 redoxon tablets) was given daily until saturation was accomplished. This dose was then raised to 400 mg. a day and continued later in conjunction with a daily dose of ℥1 of sodium bicarbonate. In Case 1 the red blood count rose again some time after the investigation had concluded, and so it was repeated; but this time the sodium bicarbonate was administered alone without any previous tests, and after the effect had been noted vitamin C was then given. Both subjects received a good well-balanced diet with plenty of milk, eggs, fruit, vegetables, and, in one case, fish.

During the course of the investigation the following tests were carried out.

1. Red blood counts every week in both cases.

2. Vitamin C content of the blood in one case only. The following method was employed. 1 c.cm. of blood serum was mixed with 1 c.cm. of trichloracetic acid and 1 c.cm. of distilled water to precipitate the proteins; the mixture was filtered, and 1.5 c.cm. pipetted off for titration. The vitamin C was titrated with a solution of dichlorophenolindophenol (Roche) prepared from tablets, each corresponding to 1 mg. of vitamin C. The solution was prepared by dissolving one tablet in 100 c.cm. of distilled water and then filtering it. 1 c.cm. of dichlorophenolindophenol solution is therefore ≡ 0.01 mg. vitamin C. The minimum blood vitamin C is taken to be 12 mg. per litre (Wolff, Banning, and Van Eekelen, 1936).

3. Haemoglobin. By the Dare method: expressed in grammes per 100 c.cm. of blood.

4. Blood pressure.

5. Daily volume of urine.

6. Daily excretion of vitamin C in the urine. Harris's modification of Tillman's method was used. Twenty-four-hour specimens of urine were collected, each specimen being acidified with 10% of its volume of glacial acetic acid just after passing. A solution of dichlorophenolindophenol was then run into a given volume of urine until a light red coloration, persisting at least half a minute, was produced. A daily excretion of less than 13 mg. implies a deficiency of vitamin C (Harris *et al.*, 1936).

7. In Case 1 in the "repeat" a red blood cell fragility test was carried out each week.

8. In the "repeat" test on Case 1 a weekly blood uric acid test was performed.

Results

Case 1.—The red blood counts, vitamin C content of the blood, Hb percentage, blood pressure, volume of urine, and daily excretion of vitamin C are given in Tables I and II. 300 mg. of vitamin C was administered daily from November 8 to 15, 1939. From November 16 onwards the dose was increased to 400 mg. daily. On November 30 ℥3 of sodium bicarbonate was given in addition. This was reduced to ℥1 daily from December 1.

TABLE I

Date	Red Cells per c.mm.	Vitamin C in Blood mg. per litre	Hb gm. per 100 c.cm.	Colour Index	Blood Pressure
4/11/39					160/110
8/11/39	7,900,000		17.6	0.8	
15/11/39	7,775,000				
23/11/39	8,250,000	16	16.2	0.71	
29/11/39	7,587,500	30	14.8	0.68	
6/12/39	6,934,250		13.8	0.71	
10/12/39		36			
13/12/39	6,500,000	30	13.8	0.77	130/90
20/12/39	6,325,000		14.2	0.8	
12/2/40	7,387,500		12.2	1.6 (?)	130/88

Urine Investigations

TABLE II

Date	Vol. Urine excreted in 24 Hours	Vitamin C excreted in Urine in 24 Hours
4/11/39	1,345 c.cm.	27.24 mg.
5/11/39	1,340 ,,	29.59 ,,
6/11/39	1,050 ,,	25.0 ,,
7/11/39	1,200 ,,	36.0 ,,
8/11/39	900 ,,	36.0 ,,
300 mg. vitamin C given daily		
9/11/39	1,100 c.cm.	30.8 mg.
10/11/39	800 ,,	29.72 ,,
11/11/39	1,050 ,,	29.4 ,,
12/11/39	950 ,,	55.1 ,,
13/11/39	1,240 ,,	99.2 ,,
14/11/39	950 ,,	114.0 ,,
15/11/39	1,050 ,,	175.3 ,,
400 mg. vitamin C given daily		
19/11/39	1,100 c.cm.	243.0 mg.
23/11/39	1,100 ,,	275.0 ,,
27/11/39	1,150 ,,	280.4 ,,
29/11/39	1,100 ,,	286.3 ,,
400 mg. vitamin C + ℥1 sodium bicarbonate given daily		
3/12/39	2,200 c.cm.	199.5 mg.
6/12/39	2,600 ,,	222.5 ,,
10/12/39	2,400 ,,	144.0 ,,
13/12/39	3,000 ,,	165.4 ,,
20/12/39	2,650 ,,	265.8 ,, (took two aspirins for headache)
26/12/39	2,450 ,,	162.6 mg.

There was a striking improvement in general health, which the patient dated from the time of taking the bicarbonate and the occurrence of polyuria. There was also a marked change in the viscosity of the blood, as seen by the naked eye, when samples were being taken for investigations.

Vitamin C and sodium bicarbonate were discontinued on December 26. On February 12, 1940, the red cells had increased to 7,387,000. It was decided to repeat the experiment. This time the sodium bicarbonate was first given on February 28, and on March 5 300 mg. of vitamin C was prescribed. Table III gives daily quantities of urine excreted. Results of the blood examination are given in Tables IV and V.

TABLE III

Date	Volume of Urine excreted in 24 Hours	Date	Volume of Urine excreted in 24 Hours
23/2/40	1,120 c.cm.	25/2/40	1,060 c.cm.
24/2/40	950 ,,	26/2/40	1,355 ,,
(Average 1,121 c.cm.)			
℥1 of sodium bicarbonate daily			
28/2/40	1,510 c.cm.	2/3/40	2,470 c.cm.
29/2/40	1,810 ,,		(2 bottles stout to-day)
1/3/40	1,850 ,,	3/3/40	1,770 c.cm.
		4/3/40	1,800 ,,
(Average 1,748 c.cm., excluding 2/3/40)			
300 mg. of vitamin C daily in addition to sodium bicarbonate			
5/3/40	2,330 c.cm.	16/3/40	2,600 c.cm.
6/3/40	1,800 ,,	17/3/40	1,830 ,,
7/3/40	1,980 ,,	18/3/40	1,570 ,,
8/3/40	1,860 ,,	19/3/40	2,260 ,,
9/3/40	2,070 ,,	20/3/40	1,660 ,,
10/3/40	1,700 ,,	21/3/40	1,740 ,,
11/3/40	1,600 ,,	22/3/40	2,100 ,,
12/3/40	1,800 ,,	23/3/40	1,700 ,,
13/3/40	1,710 ,,	24/3/40	1,650 ,,
14/3/40	1,850 ,,	25/3/40	2,180 ,,
15/3/40	2,100 ,,		
(Average 1,913 c.cm.)			

TABLE IV

Date	Blood Uric Acid	Date	Red Cells
26/2/40	4.33 mg. per 100 c.cm.	21/2/20	7,987,500
11/3/40	5.30 „ „ „ „	4/3/40	7,750,000
17/3/40	4.80 „ „ „ „	10/3/40	7,337,000
26/3/40	6.11 „ „ „ „	18/3/40	6,079,000
		26/3/40	5,488,000

TABLE V

Date	Blood Fragility	Date	Haemoglobin
26/2/40	Partial 0.40% saline Complete 0.35 „ „	21/2/40	13.4 gm. per 100 c.cm.
4/3/40	Partial 0.45 „ „ Complete 0.40 „ „	4/3/40	15.6 „ „ „
11/3/40	Partial 0.40 „ „ Complete 0.35 „ „	10/3/40	15.0 „ „ „
18/3/40	Complete haemolysis 0.45 „ „	18/3/40	15.2 „ „ „

This subject felt better after taking the sodium bicarbonate, and the addition of vitamin C caused a marked improvement in general health; but even after the blood count had fallen the facial appearance did not return to normal, although the colour was not so deep.

Case 2.—Treatment was begun on January 8, 1940. An excretion test on urine voided after a dose of 300 mg. of vitamin C (6 redoxon tablets) showed a definite deficiency. From January 10 to 24 the patient was given 400 mg. vitamin C daily. From January 17 she also received 2 drachms of sodium bicarbonate thrice daily. The following investigations were made (Tables VI and VII).

TABLE VI

Date	Red Cells	Date	Blood Pressure
5/1/40	5,250,000	25/11/39	170/115
12/1/40	5,150,000	15/1/40	170/110
21/1/40	5,000,000	29/1/40	155/110
31/1/40	4,500,000	2/2/40	145/110

Urine Investigations

TABLE VII

Date	Vol. Urine Excreted in 24 Hours	Excretion of Vitamin C in 24 Hours	Date	Vol. Urine Excreted in 24 Hours	Excretion of Vitamin C in 24 Hours
7/1/40	1,136 c.cm.		19/1/40	1,988 c.cm.	Saturated
8/1/40	568 „		20/1/40	1,704 „	
9/1/40	1,136 „		21/1/40	1,704 „	
10/1/40	1,136 „		22/1/40	1,420 „	
11/1/40	852 „	24.5 mg.	23/1/40	1,704 „	
12/1/40	1,136 „	26.0 „	24/1/40	1,136 „	
13/1/40	1,136 „	28.0 „	25/1/40	1,136 „	
14/1/40	1,136 „	34.0 „	26/1/40	1,136 „	
15/1/40	852 „	31.0 „	27/1/40	568 „	
16/1/40	852 „	35.0 „	28/1/40	1,136 „	
17/1/40	1,704 „	35.0 „	29/1/40	1,136 „	
18/1/40	1,988 „	40.0 „	30/1/40	1,420 „	
			31/1/40	852 „	

From January 24 the patient was kept on a maintenance dose of 50 mg. of vitamin C daily. There was very little change in the spleen; if anything it was slightly smaller. There was a great improvement in the patient's general condition.

A control test was carried out on a healthy person to observe the effect of sodium bicarbonate on the threshold of vitamin C excretion in the urine (Table VIII).

TABLE VIII

Dose of Vitamin C	Day	Vol. Urine in c.cm. per 24 Hours	Vitamin C Excreted in mg.
	1st day	1,350	10.8
	2nd „	1,400	8.4
	3rd „	1,300	10.4
300 mg.	4th „	1,300	5.2
300 mg.	5th „	1,650	201.3
300 mg.	6th „	1,480	195.36
300 mg.	7th „	1,400	223.7
300 mg.	8th „	1,250	225.0
300 mg. + 3l sod. bicarb...	9th „	1,850	104.4
300 mg. + 3l sod. bicarb...	10th „	1,700	100.8

Conclusions

It would appear that vitamin C has some influence in regulating the number of red blood cells in the circulation, and that in polycythaemia there is a defect in the metabolism of vitamin C. Both the subjects had a definite polycythaemia and excreted considerable amounts of vitamin C. They were deficient in the latter, however, since they did not excrete 40% of the test dose for several days (Harris *et al.*, 1936). Neither was affected by large doses of the vitamin, but when the threshold of excretion was raised by the administration of sodium bicarbonate there was a fall in the red cell count and a marked polyuria. This was especially noticeable in Case 1, and was not altogether due to the sodium bicarbonate, since in the repeat experiment a higher average excretion followed on the administration of vitamin C than was found when sodium bicarbonate was given alone. There was a definite improvement in the general condition of the subjects. In both cases a fall in blood pressure coincided with a fall in the red cell count. In Case 1 the haemoglobin percentage fell in the first experiment, but was unaffected in the repeat experiment. Neither the blood fragility nor the blood uric acid showed much variation with the fall in the red cell count. Case 1 relapsed when the vitamin C and sodium bicarbonate were withdrawn, but improved when these were given again. Further consideration of these facts would suggest that vitamin C and sodium bicarbonate might be used in the treatment of polycythaemia. The material available would not permit of more definite claims being made.

Summary

The literature on vitamin C as a regulator of the number of red blood cells in the circulating blood is reviewed.

The results are given of an investigation of the relation of vitamin C to polycythaemia in two cases.

Vitamin C alone had little effect on the condition, but in conjunction with sodium bicarbonate caused an improvement in the general health and a marked fall in the red cell count. The latter rose in one case after the experiment had concluded, but fell again when vitamin C and sodium bicarbonate were readministered.

A marked diuresis occurred after giving vitamin C and sodium bicarbonate.

It is suggested that this method merits more extensive trial in the treatment of polycythaemia.

Thanks are due to Dr. J. G. Keohane, Prof. W. W. D. Thompson, and Dr. F. Prescott for help and advice, and to Messrs. Roche Products Ltd. for generous supplies of redoxon brand vitamin C and dichlorophenolindophenol dye tablets.

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Dr. Paul Michael (*J. Amer. med. Ass.*, 1940, **115**, p. 286) investigated the blood sugar of thirty male golfers of ages ranging from 30 to 45 years and possessing handicaps of from 10 to 27. It was found that after lunch and under ordinary conditions the blood sugar of the players dropped to hypoglycaemic levels between the ninth and fifteenth holes in a foursome and between the eleventh and fifteenth holes in a twosome. These periods corresponded to the time of lessened efficiency of the players. It was found that "more ketogenic types of lunch" and the eating of sugar or candy at the seventh or ninth hole diminished symptoms and improved the scores.

SOLITARY NON-PARASITIC CYST OF THE LIVER

REPORT OF A CASE

BY

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Non-parasitic cysts of the liver may be single or multiple, are more common in females than in males in the proportion of 4 to 1, and although they may occur at any age most of the reported cases have been in children. Sonntag (1913) has suggested the following classification: (1) blood and degeneration cysts; (2) dermoid cysts; (3) lymphatic cysts; (4) endothelial cysts; (5) cysts due to bile-duct obstruction; (6) cystadenomata.

Multiple cysts may be limited to the liver alone, but more commonly they are associated with cysts of the kidneys, spleen, pancreas, or other abdominal organs—polycystic disease.

According to Moschcowitz (1906) the solitary non-parasitic cysts of the liver with which we are now concerned are congenital in nature and of biliary origin, perhaps arising from aberrant bile ducts resulting in benign cystic adenomata. The cyst is usually situated in the right lobe of the liver, although on occasion it may involve the left lobe, the quadrate lobe, or even the round ligament itself. It varies considerably in size: it may be as small as a pea or as large as a human head. It may be wholly or partially intrahepatic or it may be pedunculated.

Up to the present date some 400 cases have been reported in the literature. Stoesser and Wangensteen (1929) reviewed 104 cases, Beattie and Robertson (1932) 80 cases, and Davis (1937) 188 cases. Cases of unusual interest have been described by Wikle and Charache (1936) and recently by Jennings (1939).

Clinical Features

Solitary non-parasitic cysts of the liver apparently grow very tardily and in most instances produce few if any symptoms of note, advice being sought on account of the presence of a painless abdominal swelling. At times, however, there may be a sudden onset of acute symptoms. This is seen, for instance, when a brisk haemorrhage occurs into the cyst, when suppuration supervenes, or when, in the pedunculated variety, the pedicle becomes twisted. A correct pre-operative diagnosis is rarely made, the majority of the cases being diagnosed on exploratory coeliotomy or at necropsy.

The condition, as I have pointed out, is usually symptomless unless complications occur or the cyst compresses some adjacent viscus such as the extrahepatic bile ducts or the first portion of the duodenum. With compression there may be acute hepatic pain, nausea, vomiting, or jaundice. As many of these cysts arise from the anterior or inferior surface of the right lobe of the liver clinical examination will determine the site of the tumour, while radiography may show that the tumour is part of the liver shadow. With large cysts or tumours of the liver the colon is pushed downwards and to the left of the abdomen, whilst in the case of a large swelling of the kidney the colon lies over the tumour. This point can be verified by a barium enema *x*-ray examination of the large bowel.

In the case of a large pedunculated cyst of the liver downward displacement is limited by anchorage to the liver, but a considerable degree of lateral movement is often obtained. Pneumoperitoneum followed by *x*-ray examination may be helpful, and peritoneoscopy may clinch the diagnosis. Liver-function tests as a rule show little deviation from the normal. According to Schaack (quoted by Ackman and Rhea, 1931) the operative death rate of non-parasitic cysts of the liver is 12%. Beattie and Robertson estimated the mortality at 16.1%, whilst in Boyd's (1913) series it was as high as 32.3%.

Treatment

Excision of the cyst is the ideal treatment. This is possible when the cyst has a pedicle; when it is situated in an accessible position it can either be enucleated or be removed by wedge resection. In the cases reported by Davis and by Jennings the broad pedicle by which the cyst was suspended from the liver was crushed by Ochsner forceps, cut across distal to the clamp, and then transfixed, firmly ligatured, and oversewn with strong chromic catgut. In Wikle and Charache's case the cyst was shelled out of the liver substance just lateral to the gall-bladder. After the cyst had been removed the margins of the denuded surface of the liver were approximated with interrupted sutures, leaving a right lobe fairly normal in size and appearance. There was no evidence of haemorrhage into the cyst cavity, nor was there any palpable evidence of cystic involvement of the kidneys, pancreas, or other abdominal organ.

When the cyst is largely intrahepatic the fluid should be removed by aspiration; the cyst wall should be laid open, and as much of this as possible should be excised. The resulting cavity is then packed with gauze and marsupialized. A great number of cases have been reported where marsupialization and drainage have had to be carried out because extirpation of the cyst was impossible. In all cases the kidneys, pancreas, and other organs should be examined for the presence of multiple cysts, and if these are found nothing surgical should be attempted. During operation on a solitary cyst of the liver it is of the utmost importance to wall off the cyst from the rest of the abdominal cavity in order to avoid spilling the contents of a possible hydatid cyst.

Case Report

A housewife aged 49 was admitted on June 11, 1937, to the Southend General Hospital under my care, complaining of a large painless swelling in the upper abdomen. She had never been abroad, and there was nothing of particular interest in her history. There was, for instance, no history of indigestion, of colicky abdominal pains, of jaundice, or of a sharp blow in the epigastrium or over the right lower ribs, nor had she at any time noticed that her stools were putty-like or that her urine was dark brown in colour. She was worried about the steady increase in size of the abdominal tumour.

On examination she proved to be a healthy well-covered woman; the heart and lungs were normal, the spleen and kidneys were not palpable, and an investigation of the pelvic organs revealed that the uterus and adnexa were healthy. The right hypochondriac region and the epigastrium were occupied by a large painless cystic tumour which moved freely on respiration. The cyst was continuous with the hepatic dullness above, while below in the region of the umbilicus its smooth rounded lower margin could be readily made out. It could not be reduced to the right loin, and there was little if any lateral mobility. There was no thrill on percussion, the temperature and pulse rate were normal, the urine contained no abnormal constituent, and the stools were light brown in colour and well formed.

A barium meal examination showed the stomach, the duodenum, and the right colon to be displaced downwards and towards the middle line by the dense hepatic mass, whilst a cholecystogram revealed an elongated but well-functioning gall-bladder.

Following these investigations it was decided to explore the abdomen in order to investigate the nature of the cystic swelling. The exploration was conducted through a lengthy

right paramedian incision. It was at once seen that the right lobe of the liver was entirely replaced by a globular cystic swelling, the surface of which was pearly white in colour and was traversed by many thin-walled tortuous veins. The adherent gall-bladder was stretched out over the cyst as a long sausage-like green rubber balloon. The gall-bladder was compressed with the fingers and its contents were expressed. Its flaccid walls were found to be healthy and elastic; no gall-stones were present, and the common bile duct was seen to be normal in appearance. The contents of the cyst were aspirated, and as much as three pints or more of colourless, odourless, sticky, alkaline, albuminous fluid was withdrawn. Following the aspiration the cyst wall collapsed into a shapeless mass. The interior of the cyst was trabeculated and was smooth and shiny, suggesting that it was lined with a well-formed layer of cubical epithelium. The walls, which were nearly 5 mm. thick, were anchored to the skin of the abdominal wound. A large-bore rubber tube was inserted into its spacious cavity and sutured into position, and during the first week after operation there was a considerable discharge of brown-stained gummy fluid. This, however, soon ceased following daily instillations of quinine-urethane and lithocaine.

The patient was discharged from hospital on the twenty-first day after operation with the abdominal wound soundly healed. She was examined again by me nearly nine months later, when she was looking the picture of health and there was no sign of any return of her former trouble.

Summary

The clinical features of solitary cyst of the liver are described and an account is given of the appropriate operative treatment.

An illustrative case is reported.

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Clinical Memoranda

Surgical Emphysema Complicating Phthisical Haemoptysis

The rarity of this complication is the reason for reporting its occurrence.

HISTORY OF CASE

On November 17, 1937, a native boy was admitted to hospital complaining of epistaxis. A week previously, on the evidence of a positive blood film, he had been treated for malaria. Unfortunately I have no notes of the state of his chest on admission, as he had lost his out-patient notes; but I cannot recollect any gross lesion. Subsequently the following history was obtained from him (by interpretation—often a painful and weary procedure!). He had had a slight cough since the previous July, which had started when he "had brought up some blood." He had had no pain or fever, but afterwards used to get some pain in the shoulders and the lower part of the chest on the left side. It had, however, in no way interfered with his football.

On November 18 I was called to him in the morning on account of a very severe haemoptysis. He had already filled a large kidney bowl with frothy blood, and there was a fair amount in a bucket as well. His pulse was hardly perceptible, and owing to his critical condition no detailed examination of his chest was made. He was kept under morphine for about forty-eight hours. Examination on November 20 revealed surgical emphysema over the whole thorax, back and front, the neck, and face, limited above by the temporal fascia. The lower limit then was the inguinal ligament on the right side, and roughly the crest of the ilium and the umbilicus on the left side. By the next day it had reached the inguinal ligament on the left and the scrotum on the right side, and by the following day both sides showed surgical emphysema in the scrotum. The day after the haemoptysis his temperature, which had been normal on admission, rose to 103°, at which point it remained for about five days; for the next ten days it was round about 101°, and it did not descend to normal until three weeks after the haemorrhage. For three weeks there was then a nightly rise to about 99.6°, and after that for a few months to 100° or 101°.

The haemorrhage stopped on the second day, and the surgical emphysema ceased to spread after reaching the upper limit of the temporal fascia and the lower limit of the inguinal ligaments and the scrotum. Thereafter it gradually diminished over the whole area, and by December 7 it had entirely disappeared. Thus I could detect no trace of surgical emphysema seventeen days after I had first discovered it.

Eighteen weeks after the boy's admission the physical signs in the chest were as follows: The sputum contained tubercle bacilli. The patient was wasted, the ribs and Mohrenheim's fossae showed up markedly, and the left apex revealed diminished movement. The apex beat was visible two inches from the midline in the fourth intercostal space: palpation confirmed this, and also revealed a diminished vocal fremitus at the left apex, where there was a "boxy" note on percussion, with bronchial breathing and increased vocal resonance, with whispering pectoriloquy on auscultation. No adventitious sounds were heard at this apex. After the disappearance of emphysema there was for a week a coarse pleural rub over the whole chest; this remained at the right base and was still persisting at the time of this examination.

Unfortunately in May, 1938, the boy's parents insisted on taking him away to their little native kraal, where after a few weeks he had another haemoptysis and died.

COMMENT

One can only assume that following his first small haemoptysis adhesions persisted somewhere between the two layers of pleura, which was the site of the second tuberculous ulceration. This ulceration must have eroded both layers and a vessel at the same time; or possibly the double layer was weakened by the disease process, and the erosion of a near-by blood vessel caused a violent fit of coughing with consequent rupture of the weakened pleura. It is difficult to fix the point of rupture. If it were the left apex it is not easy to say why the spread of the emphysema was more rapid on the right side; yet, on the other hand, the more rapid spread to the upper limit suggests that the apex was the site of the pleural lesion, more especially as it was on the left side that the patient had felt discomfort in the months following the early mild haemoptysis in July.

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Recurrent Peptic Perforation

The term "recurrent peptic perforation" has been used indiscriminately to describe a recurrence of perforation whether of the same or of a fresh ulcer, or even of an anastomotic ulcer. All these varieties of recurrence are rare, but a search for recorded cases reveals that this rarity is not so marked as to justify an apparently commonly held belief that if the patient has had one perforation he need not fear another. The following notes of a case of recurrent duodenal perforation illustrate this point.

CASE HISTORY

The patient, a woman aged 65, gave a long-standing history of gastric trouble. In April, 1938, she had a haematemesis, following which she was radiographed and the diagnosis of duodenal ulcer confirmed. On May 9, 1939, she was admitted to hospital under my care exhibiting typical signs and symptoms of perforation. Operation revealed a moderate-sized perforation of a chronic ulcer on the anterior aspect of the duodenum. As there was no evidence of stenosis the

perforation was sutured and the abdomen drained. Convalescence was uneventful. On appropriate diet she remained well for about a year, but later became careless about her food. Pain returned with some vomiting, and on May 3, 1940, she had a slight recurrence of the haematemesis. Despite stricter dietetic measures her symptoms persisted intermittently, but she refused to consider any operative treatment. On August 14 she was readmitted to hospital suffering from perforation. At operation it was found that the ulcer had increased in size, and that the perforation was a large one. Despite the size of the ulcer there was no marked stenosis, and as the patient's condition was poor, closure and drainage was again performed. Once more a good recovery was made, and up to the moment she has remained well.

DISCUSSION

Cases of recurrent perforation have been reported by several writers (Moynihan, 1910; Butler, 1928; Wheeler, 1933), that of Moynihan being a duodenal ulcer, and it would appear from the few cases available that recurrent perforation beyond the pylorus is rarer than in the stomach itself. Cases have also been reported in which perforation recurred more than once. Grey Turner (1925), McKnight (1923), Butler (1928), Sallick (1936), and Mahoney and Sands (1937) all cite cases in which it recurred twice; and Henry (1937) and Lysaght and Williams (1937) record cases in which there were four perforations, in each instance spread over a period of about five years.

The fact that these patients usually do well for a fair length of time after the operation may account for the common attitude of complacency of their medical advisers, though it has long been recognized (Lewisohn, 1920) that the closure of a perforation will not in itself necessarily cure the ulcer. Indeed, this immediate improvement may only be due to the fact that the salutary lesson of an emergency operation causes the patient to adhere more strictly to his diet than perhaps he did before, though it has been found that perforation may recur despite a strict adherence to dietetic restrictions.

Opinion as to the immediate treatment of perforation varies from simple closure to the emergency partial gastrectomy of mid-Europe. Gastro-enterostomy has fallen into disfavour, and both Butler (1928) and Ehrlich (1928) report cases of the subsequent perforation of an anastomotic ulcer. Lysaght and Williams (1937) also record as a failure a gastro-enterostomy performed on their patient between his second and third perforations. A partial gastrectomy, however, carried out after the fourth perforation kept the patient well up to the time of the report, three years later.

Emergency partial gastrectomy apart, the future of the case depends, of course, on whether the ulcer heals under the subsequent medical treatment. If it does not heal within a reasonable time, especially in the case of old-standing gastric ulcer, or if it recurs, it would seem that the chance of a recurrence of the perforation, though slight, is perhaps not quite so remote as is generally thought, and that further surgical intervention should not be too long delayed.

GAVIN MILROY, M.D., F.R.C.S.Ed.

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J. Cailiaret (*Thèse de Paris*, 1940, No. 239), who records four cases in patients aged from 15 months to 49 years, states that retroperitoneal teratoma is a rare condition. The diagnosis is relatively easy when the tumour is mature, but is almost impossible when it is little developed. Operation is the only suitable treatment. The best method is total removal of the growth. The operation is a very severe one, the mortality being 71 per cent.

Reviews

PLASTIC SURGERY

The Surgery of Injury and Plastic Repair. By Samuel Fomon, Ph.D., M.D. Formerly Major, Medical Corps, U.S. Army. A William Wood book. (Pp. 1,410; 925 figures. $15.00, or 94s.) Baltimore: The Williams and Wilkins Company; London: Baillière, Tindall and Cox. 1939.

Every plastic surgeon, and many others, will be grateful to Dr. Samuel Fomon for one of the best books on this subject that has been published. Good books on plastic surgery fall into two main classes. Some are written by individualists, who give their own opinions, experiences, and results, and not much else. These are interesting, especially to the expert, who uses his own knowledge as a standard of comparison. Dr. Fomon, on the other hand, belongs to the group of surgical scholars whose knowledge of other people's work is encyclopaedic. When such men decide to write they collect all the information they can find, extract the essentials, and present a true account of the different arguments they have met. Their task is difficult; they must steer their course between prolixity and an excessive condensation which leads to obscurity. Dr. Fomon has carefully avoided the second of these; his style is clear and his summarization admirable, but much extraneous matter has been included.

The first part of the volume, roughly one-third, surveys the problems and the methods of reparative surgical treatment of injuries. Operative technique, tissue transplantation, and the treatment of wounds and of burns each occupies a chapter. Next comes a survey of such general problems of traumatic surgery as shock, fluid, salt, and acid-base balance, and pre- and post-operative treatment. Important as this information is, a surgeon who undertakes reparative surgery should have learnt it all during his general surgical training. Local anaesthesia is discussed briefly but clearly, but general anaesthesia would probably have been dealt with somewhat differently by an anaesthetist.

The second part of the book is a regional survey of some injuries and their repair. Cranial injuries come first, and there are copious notes on the cerebral injuries which usually overshadow the picture. Even so, we think a plastic surgeon would feel safer if he had the collaboration of a brain surgeon in dealing with these cases. Congenital abnormalities of the brain and skull are also discussed, but it is difficult to see how these can be included in a volume of this nature. Excellent chapters follow on the nose, the eyelid, the auricle, the lip, the mandible, and the maxillo-facial region. Here again the author has included much which is neither traumatic nor reparative surgery, and the material on cleft lip and palate, on salivary glands, and on surgical affections of the skin is also outside the scope of this work.

The author has not, however, omitted anything of importance, and the extraneous matter which has slipped in is well worth reading. Each chapter has its own extensive bibliography, that on the nose having no fewer than 342 references. Illustrations are profuse, but while the line drawings are excellent, some photographs have not come out so well. The type is clear, and there is an alphabetical index of the contents.

A SURVEY OF NUTRITION

Ernährungslehre: Grundlagen und Anwendung. Edited by Professor Wilhelm Stepp. Berlin: Julius Springer. 1939.

Scientific investigations in nutrition have developed during the last few decades in five main directions: (*a*) the calorie values of foods; (*b*) the body-building values, including

lately the biological values of different proteins; (*c*) the mineral content of foods: not only iron and calcium in "available" forms but also certain elements of which traces only are necessary for nutrition; (*d*) water, long known to be the least dispensable part of a diet, but whose role in metabolic processes is only now beginning to be understood; and (*e*) the vitamins, of which fresh ones seem to be discovered every year. *Ernährungslehre: Grundlagen und Anwendung* deals with the first four of these in its first 107 pages. The next 376 pages deal with the vitamins, and the last 100 with the subject of dietetics. The book is a comprehensive survey of the subject, arranged so that the whole field of nutrition is reviewed. Each section or subsection has been written by a different author, and most of the authors have been active workers on the subject or a part of the subject on which they were asked to write. Thus Lehnartz has dealt with nutritional needs, the importance and function of different foodstuffs, water, and minerals. Rudy has surveyed the chemistry of the vitamins, Bleyer foods and their production, Diemair the manufacture of foods, and Schittenhelm underfeeding and overfeeding. Avitaminosis and hypovitaminosis have been treated of by Pillat (vitamin A), Schüffner (vitamin B_1 and beriberi), Schroeder (shortage of vitamin B_1 as a European problem), Kühnau (vitamin B_2), Mollow (pellagra), Stepp (vitamin C), Schönfeld (vitamin D), and Vogt-Möller (vitamin E). Wendt has considered the relation of the vitamins to certain pathological conditions (disturbances of the endocrine glands, infection, disturbances of the blood, and diseases of the gastro-intestinal tract). Glatzel has dealt with dietetics generally for the healthy and the sick, and with hospital diets. Flössner discusses nutrition as a social problem, the feeding of communities such as the army (in different countries), the navy, the air force, the land army, schools, students' hostels, hotels, etc., and the feeding of the various peoples of the earth classified as Europeans, Asians, Africans, Americans, Australians, and those of the Polar regions. Finally, Wirz has discussed what guidance to sound nutrition may be gained from a survey of the general state of health of different nations and groups of individuals throughout the world.

The book is a sound work of reference, and in certain sections full bibliographies are given. In other sections the references are regrettably few, and readers will have to search other sources for details of publication of the work summarized. The type, figures, reproductions of photographs, and binding are all very good.

ATLAS OF SURGICAL OPERATIONS

Atlas of Surgical Operations. By Elliott C. Cutler and Robert Zollinger. Illustrated by Mildred B. Codding. (Pp. 181. 31s. 6d. net.) New York: The Macmillan Company; London: Macmillan and Co., Ltd.

This magnificent atlas aims at giving the young surgeon visual pictures of all the ordinary surgical procedures he is likely to require. Each procedure is illustrated in the most exact detail, so that from mere study of the drawings, without any reference to the letterpress, he will understand exactly what he has to do down to the tying of each ligature and the insertion of each suture. The outlook is essentially practical, and the authors have wisely restricted themselves to those orthodox measures which have stood the test of time, and to which, undoubtedly, every surgeon should restrict himself in the earlier stages of his career. We would, indeed, go further, and say that no surgeon should attempt any procedure other than those here described unless special training and research have given him a peculiar facility for other methods.

The range of the atlas is very wide and includes the surgery of the thyroid, the chest, the abdomen, and even the surgery of infections, nerve suture, and the general principles of amputation. Modern methods of colectomy are described with such precision that they could be carried out by any young surgeon with good hands, even though he may have had little practical experience. On a smaller scale, though perhaps of even greater practical value, are the illustrations showing how to deal with infections of the fingers and hand and the exact detail of skin grafting. We would congratulate the authors and the artist on a really magnificent volume of value both to the youngest student and to the most experienced surgeon. The atlas is an object lesson in the importance of those meticulous details on which the success of modern surgery depends.

GENETICS OF MAMMALS

Mammalian Genetics. By W. E. Castle, Professor Emeritus of Genetics, Harvard University. (Pp. 181; 131 figures. 11s. 6d.) And *Manual for a Laboratory Course in Genetics* to accompany the textbook. (Pp. 33. 3s.) Massachusetts: Harvard University Press; London: Oxford University Press. 1940.

To those who are not professed biologists, and to some who are, the usual laboratory material of genetics seems remote from practical experience, while the presentation, too, seems not infrequently to be arid and formal. Prof. Castle has attempted a twofold task in his book. In the first place he gives a brief though useful account of present-day knowledge of the genetics of mammals. In the second, he expounds, so far as is possible, the whole subject of genetics in terms of these familiar forms. The second aim cannot, of course, be completely realized, and he does not hesitate to refer to Drosophila, fish, or other living things when necessary. As might be expected from Prof. Castle, the result is a very readable book, with a great deal of information simply imparted in remarkably few pages. The volume might be useful as a textbook for students of agriculture and veterinary science. There is one unfortunate error in the account of the human blood groups. The MN series is described as MN, M, N, O, instead of MN, M, N. Nor is any reference made to the well-established subdivision of blood group A.

In view of the possible use of the volume as a textbook, an accompanying laboratory manual has been provided. A good practical course is outlined, though very briefly; the details given would certainly have to be amplified by the teacher. An excellent feature is the encouragement of the student to apply tests of significance to his results, but it is a pity that the old inexact methods are given instead of the exact ones now available. The latter are actually easier to apply, and their use is particularly desirable with numbers as small as those envisaged here. This regrettable feature is rendered all the more prominent by the wasting of no fewer than twelve pages on tables that do no more than save a couple of multiplications and the extraction of a square root.

CLINICAL DIAGNOSIS AND TREATMENT

Practical Bedside Diagnosis and Treatment. By Henry Joachim, M.D., F.A.C.P. (Pp. 834. 41s.) London: Baillière, Tindall and Cox.

Several volumes have been noticed in these columns recently in which emphasis is laid on clinical rather than on laboratory methods of diagnosis, and Dr. Joachim's book provides another instance of this. Naturally he does not spurn the aid of the laboratory, but he expresses his "feeling that routine laboratory surveys and fine-combings must not usurp, displace, or blunt the diagnostic skill of the senses and reasoning based on sound anatomical and physiological principles. The laboratory must co-operate,

collaborate, and supplement, but should not dominate, the diagnostic processes." This emphasis on "first things first" is a healthy and encouraging sign of a reaction against diagnosis by simply collecting pathological reports, which of late threatened, if not to blunt diagnostic skill, certainly to encourage laziness of thought at the bedside. In the main the author justifies his claim, but in a textbook on treatment such a statement as "reassurance, breathing exercises, sedatives, and psychotherapy are indicated" (p. 179) lacks helpful detail. The section on the treatment of phlebitis deals only with the more conservative and conventional procedures, and has nothing to say of such modern methods as, for example, Dickson Wright's. Then, again, to dismiss treatment by zinc-protamine-insulin merely by saying that it "has the advantage of more prolonged and sustained action and slower development of insulin 'shock'" is quite inadequate in a book of this type. This inadequacy is particularly glaring in a volume which devotes six pages merely to lists of foods with their percentage compositions, yet without any guidance as to the arrangement of these foods in a suitable diet. Such things are rather serious flaws in a book which is by no means without merit, and which shows distinct originality.

We are glad to see attention called to the presence of a functional presystolic murmur at the beginning of a physical examination of nervous subjects when the cardiac rate is accelerated. This has given rise to considerable doubts and disputes in the examination of recruits for military service, and deserves more attention than it has received hitherto. We agree with the author's conclusion that what is called clinical instinct is largely based on subconscious memories of experiences.

Notes on Books

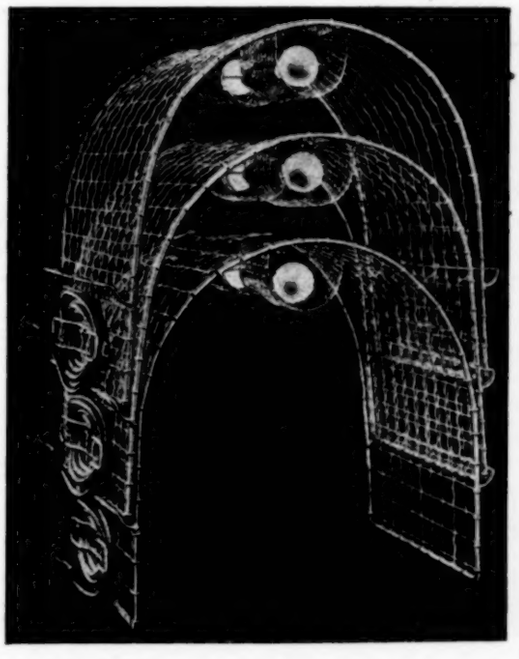
Dr. JULIUS BURSTEIN has produced a second edition of *Illustrative Electrocardiography* (D. Appleton-Century Company, 25s. net), originally written in collaboration with the late Dr. Joseph H. Bainton. The essentials of electrocardiography are conveyed through the medium of 106 plates in which some hundreds of cardiograms are reproduced. All or nearly all the common abnormalities, and some rare ones, are illustrated, the tracings being on the whole good, though as a rule a black line on a white background shows up more clearly than the reverse as used in this book. The tracings would be more easily read by the beginner if they were reproduced on a rather larger scale. The text consists almost entirely of analyses of the cardiograms, which are fully described and easily understood. Little or no theoretical matter is introduced. The interpretation of the curves is generally sound, though in one or two instances perhaps it is open to question. In the description of bundle-branch lesions the new type of right branch lesion is not included, and in dealing with these lesions and also with ventricular extrasystoles the new terminology is used throughout. Most of the cardiograms do not show a precordial lead, but there is a final section in which chest leads are adequately described. This book can be strongly recommended as a sound and easy introduction to the subject.

As Dr. E. Miller says in his foreword to *Parents and Children*, by Mrs. NORA ARIS (Stanley Paul and Co., 5s.), the psychiatrically trained social worker in the modern child-guidance team has a remarkable opportunity of observing the reactions of parents and children. Mrs. Aris, with her wide experience, has fully utilized the chances with which her work has presented her to compile a most useful guide to the complex relationship of home life, from which it is perhaps more remarkable that so many children emerge relatively unscathed than that some should become nervous, difficult, or retarded. After a brief description of the normal development of character some problems of the nursery are discussed, and then the three types of trouble in childhood are reviewed both in respect of the causative agencies and situations and of their effects, which may be direct or indirect. It is pointed out that nervousness is the expression of the child's own reactions to life, while difficulty is often the measure of the parents' failure to manage the child. Retardation, as opposed to inherent backwardness, may be met with in dull, normal, or even supernormal children as a result of emotional situations to which the child is failing to adjust, and the importance of recognizing and removing these is obvious. The titles of the remaining chapters—"Ill-health and its Social Effects," "Adolescence," "The Family Pattern," "The Parents' Attitudes," "The Broken Home," and "Neighbourhood Influences"—indicate the scope of the remainder of the book, while Miss Addis contributes a final chapter on the problems of the evacuated children, which shows what of good and what of ill we may expect of this great experiment, and the lessons we may learn from it in the social reconstruction that we hope may follow the war. This little book should prove a useful guide to parents and others for whom the welfare of the growing child is of interest and importance.

Preparations and Appliances

A NEW CAGE FOR SHOCK RESUSCITATION

The use of electrically heated cages is now the most widely employed method for the resuscitation of cases of shock, and one that is undoubtedly of great value. As a rule these cages are notoriously clumsy things to store and handle. To obviate these disadvantages the Medical Supply Association, Ltd., of 167, Gray's Inn Road, W.C.1, has produced the "Restor" shock cage, made in a compact nest form that is particularly adapted for easy fitting and storage. These cages are constructed as a framework in the form of an inverted "U,"



and measure 18 in. long by 20 in. wide by 21 in. high, and are claimed to be light, simple, and cheap. They may be used on a bed, couch, or stretcher suitably covered by blankets to conserve the heat. In the arch of the cage are two heat units of the carbon filament type of sufficient intensity to generate the heat necessary to maintain the patient's temperature at the desired level. Each is fitted with safety devices and a thermostat for temperature control; provision is also made for multi-connexion where a number of cages are in use. The makers will be pleased to forward on request a copy of their brochure, R.S.C. 840, illustrating and describing the "Restor" shock cage.

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PHARMACOLOGY OF THE SULPHONAMIDES

The therapeutic results that have followed the use of the sulphonamides in a wide variety of conditions have been so brilliant that less attention has been directed to the changes which they undergo in the body. These changes are, however, of very great importance, as both the therapeutic activity of the compounds and many of the toxic reactions for which they are responsible are closely connected with the presence of various breakdown products in the tissues. A number of interesting observations have been made on the fate of sulphanilamide in the body. Fuller[1] in 1937 suggested that sulphanilamide was excreted in the urine in a conjugated form, and he and Marshall and his colleagues[2] independently isolated acetylsulphanilamide. The acetyl compound was found to be more toxic than sulphanilamide. Sulphapyridine also undergoes a similar conjugation in man, but the extent to which acetylation occurs varies considerably, not only in different species of animals but from one individual to another and even in the same individual during the course of administration of the drug. At the same time Southworth[3] noted a fall in the CO_2-combining power of the blood of patients receiving sulphanilamide, to counteract which the administration of sodium lactate or $NaHCO_3$ has been recommended. The former is the more efficient, as it is an acetyl precursor, and, as James[4] has now shown, acetate given at the same time as sulphanilamide decreases the acute toxicity of sulphanilamide by preventing the metabolism of acetate precursors. By this means the fall in CO_2-combining power of the blood is prevented, as is the fall of glucose in the blood, glucose also being an acetate precursor. Acetate, in addition to providing acetyl radical directly, produces an alkaline urine, in which the bactericidal properties of sulphanilamide are most enhanced. The direct toxicity of sulphapyridine is, again, due to the withdrawal of acetate precursors and subsequent lowering of the CO_2 capacity of the blood. As acetylsulphapyridine is very easily precipitated from the urine, giving rise to haematuria or even to uroliths, caution should be exercised in giving acetates with sulphapyridine before further experiments have been carried out on animals. There is also considerable evidence that the sulphonamides undergo oxidation in the body and that these oxidation products are of high importance in the causation of toxic reactions, which occur more especially in those individuals in whom either these substances are formed rapidly and in excess or there is defective destruction and elimination.

The first indication that sulphanilamide might be oxidized in the tissues was obtained by Colebrook and Purdie,[5] who diagnosed cyanosis in fifty-three patients, in only forty-five of whom was it possible to detect either methaemoglobin or sulphaemoglobin. Marshall and Walze[6] found methaemoglobin in only two of seven cyanosed patients on sulphanilamide. Calcium hypochlorite acting on sulphanilamide resulted in a black oxidation product. Harris and Michel,[7] in a survey of patients with sulphanilamide cyanosis, observed in several a diffuse darkening of the blood with, on spectroscopic examination, maximum absorption in the red at 670 mμ. Methaemoglobin and sulphaemoglobin were absent from these samples and the pigment was neither haematin nor methaemalbumin. Webb and Kniazuk[8] also reported an unidentified foreign pigment in the blood of normal rats receiving sulphanilamide. The nature of this abnormal pigment has been further studied by James[9] and by Fox and Cline.[10] James has found that by the oxidation of sulphanilamide and sulphapyridine pigments are formed which can be absorbed on to the fatty envelope of the red blood corpuscles, producing an effect resembling that of blood from some cyanosed patients. Fox and Cline suggest that the pigment which gives the absorption band in the red is the brown reduced form of the blue oxidation product, which can be obtained *in vitro* by the aerobic ultra-violet irradiation of dilute aqueous solutions of aqueous sulphanilamide (Fox, Cline, and Ottenberg[11]). Barkan,[12] in addition, has reported that solutions of sulphanilamide treated with oxygen form hydrogen peroxide and a blue-violet compound which is reversibly reducible and oxidizable, while Rosenthal and Bauer[13] have found that on oxidation of sulphanilamide by means of ultra-violet light or by ferric chloride and hydrogen peroxide the sulphonamide group is split off.

It is possible that *in vivo* the blue oxidation product oxidizes haemoglobin to methaemoglobin and is itself reversibly reduced. The question is still further complicated by the fact that other oxidation products of sulphanilamide and sulphapyridine are present in the urine of patients treated with sulphonamides. Rosenthal[14] found hydroxylamine sulphonamide in the urine of animals and patients given sulphanilamide, while James[15] has isolated *p*-N-acetylhydroxylaminobenzenesulphonamide, *p*-hydroxylaminobenzenesulphonic acid, and *p*-aminophenol from the urine. These substances appear to be excreted in conjugation with sulphates and glycuronates, while *p*-aminophenol undergoes further change to give rise to a pigment which is also excreted. The presence of these oxidation products is of much interest. Phenylhydroxylamine, for instance, is known to cause eczematous rashes in certain susceptible individuals, while both the hydroxylamine compound and *p*-aminophenol in the unconjugated form can produce methaemoglobin from haemoglobin. Incidentally, Rimington and Hemmings[16] have pointed out that all those substances capable of producing methaemoglobin are also apt to produce excessive porphyrin excretion,

[1] *Lancet*, 1937, **1**, 194.
[2] *Science*, 1937, **85**, 202.
[3] *Proc. Soc. exp. Biol.*, N.Y., 1937, **36**, 58.
[4] *Biochem. J.*, 1940, **34**, 633.
[5] *Lancet*, 1937, **2**, 1237.
[6] *Johns Hopk. Hosp. Bull.*, 1937, **61**, 140.
[7] *J. clin. Invest.*, 1939, **18**, 507.
[8] *J. biol. Chem.*, 1939, **128**, 511.
[9] *Biochem. J.*, 1940, **34**, 636.
[10] *J. clin. Invest.*, 1940, **19**, 123.
[11] *J. Pharm. exp. Therap.*, 1939, **66**, 99.
[12] *Proc. Soc. exp. Biol.*, N.Y., 1939, **41**, 535.
[13] *Science*, 1940, **91**, 509.
[14] *J. Amer. med. Ass.*, 1939, **113**, 1710.
[15] *Biochem. J.*, 1940, **34**, 640.
[16] Ibid., 1939, **33**, 960.

the chemical grouping necessary for this reaction being an aromatic amino group unsubstituted or potentially free. There is also some reason for believing that the same grouping is responsible in certain susceptible individuals for the occurrence of agranulocytosis, while many of the symptoms of acute porphyrin poisoning are not unlike those produced by the sulphonamides. In these circumstances it seems desirable to explore still further the chemotherapeutic potentialities of substances lacking an unsubstituted or potentially free aromatic amino group.

THE MYSTERY OF THE VANISHING LYMPHOCYTE

To superficial observation the lymphocyte appears to be one of the most insignificant and uninteresting cells of the body, for it is little more than a round, dense, and compact nucleus surrounded by a narrow rim of cytoplasm. As seen in an ordinary blood film it lacks the tinctorial delicacy and intriguing variations of the polymorph, and it certainly has nothing of the brilliance of the eosinophil. Yet the lymphocyte is the centre of a profound mystery which has hitherto baffled all the attempts of the anatomist and physiologist to solve it. The mystery is simply this: in an animal such as the dog it is estimated that over 200,000,000 of these cells are poured through the thoracic duct into the blood stream every hour, and yet the lymphocytic content of the blood remains constant except for certain rhythmic fluctuations during the day. What happens to all these cells? Three alternative suggestions have been put forward. One of these is that they filter out of the blood capillaries into the tissue spaces, to be taken up again and again by the lymphatic capillaries. In other words, they are in continuous circulation. This possibility has now been definitely negatived by the work of Yoffey and Drinker.[1] By a careful analysis of lymph in peripheral lymphatics and in the thoracic duct these investigators have found that out of every thirty lymphocytes which enter the blood by the thoracic duct only one finds its way back into the lymphatic capillaries. The other twenty-nine take their origin from the germinal centres of lymph nodes through which the lymph passes on its way to the thoracic duct, and must go somewhere else. Another suggestion is that the lymphocytes are filtered off from the blood stream into the mucous membrane of the gastro-intestinal tract, and from there are discharged into the lumen of the gut. But Yoffey's observations[2] on a chloralosed animal in which the major part of the gastro-intestinal tract had been excluded from participation in such a process have shown that, if this method of elimination is effective at all, it can account for only a proportion of lymphocytes.

The third alternative is that the lymphocytes are carried by the blood stream to the bone marrow, where they are deposited to play an essential part in the differentiation of various kinds of blood corpuscle. This conception has an important bearing on the developmental potentialities of the lymphocyte. According to this interpretation the lymphocyte is really an embryonic type of cell which is capable of undergoing differentiation to form red corpuscles and several varieties of white corpuscle, and experimental evidence has been adduced from time to time in support of this idea. But it is very doubtful whether such evidence is secure. Some ten years ago the American anatomists E. R. and E. L. Clark[3] watched lymphocytes over a period of several days in the translucent tails of amphibian larvae, and they have since observed them in the living tissues in the transparent chambers of rabbits' ears, but they have never been able to observe them undergoing any metamorphosis. The cells have a characteristic amoeboid motility, but they always remain lymphocytes. Similarly, in tissue cultures W. H. Lewis[4] has found that lymphocytes always remain distinct from other types of cell, with no tendency for transformation into the latter. These observations have quite recently received additional confirmation. Ebert, Sanders, and Florey[5] report that individual lymphocytes, followed over a period of twenty-four hours in transparent chambers in rabbits' ears, undergo no metamorphosis, while J. Medawar[6] likewise concludes that under the conditions of tissue culture they persist unchanged. Important though these negative conclusions are, they do not finally dispose of the haemopoietic possibilities of the lymphocyte, for it may be that lymphocytes require to be activated by some agency present within the environment of the bone marrow before they can undergo differentiation. Perhaps the final solution of the ultimate destination and fate of these cells will only be obtained when a technique has been discovered whereby they can be "marked," so as to be recognizable wherever they go. This method is well known in the field of experimental embryology, where individual groups of cells may be vitally stained with dyes such as neutral red or Bismarck brown, allowing their migrations and ultimate destiny to be followed without difficulty.

If the fate of the lymphocyte still remains an unsolved mystery, its functional significance is no less obscure. There is some evidence that it can elaborate antibodies, and the lymphocytic infiltrations which are characteristic of certain bacterial and virus infections certainly suggest some mechanism of defence. It is interesting to note, however, that in a recent paper Yoffey and Sullivan[7] show that vaccinia virus is fixed by lymphocytes, and they suggest the possibility that the perivascular infiltrations of these cells in many virus diseases, far from being in the nature of a reaction, may actually be responsible for the first introduction of the virus into the affected region.

UNIFICATION OF SHELTER CONTROL

Nine months ago we congratulated one another on a winter of immunity from serious epidemics in spite of the risks attending the new social experiment of evacuation. In this second war winter, with the more sombre social problem of night sheltering, such an escape is hardly likely to be repeated. The shelters which were expected to be places of only temporary refuge have become the nightly abode of hundreds of

[1] *Anat. Rec.*, 1939, **74**, 417.
[2] *J. Anat.*, 1937, **72**, 155.
[3] *Amer. J. Anat.*, 1930, **45**, 149.
[4] *Anat. Rec.* (Supplement), 1938, **70**, 51.
[5] *Brit. J. exp. Path.*, 1940, **21**, 212.
[6] Ibid., 205.
[7] *J. exp. Med.*, 1939, **69**, 133.

thousands of people in London alone, and with air attacks on provincial towns a large part of industrial England and Wales has to face the same situation in varying degrees. Every late afternoon in London sees a migration of people to the shelters, some of them coming considerable distances. The City of London, which has a normal night population of 9,000, now sleeps 20,000, and its shelters could accommodate twice as many. Much the same is true of the City of Westminster. The number of shelterers in the Tubes is estimated at round about 100,000. The cheerfulness of the shelterers in their dingy surroundings has been remarked by every visitor. How much of this cheerfulness is due to a feeling of shared misfortune and to the novelty of the experience with its unusual social contacts will be seen as the months go on, with the possibility of weariness and depression and lowered resistance. A good deal of air-borne infection has already been reported, as well as minor contagions such as impetigo and scabies, while the likelihood of the swift spread of lice-borne disease in such circumstances hardly needs to be pointed out.

In connexion with this last, one compulsory measure which should be taken immediately is the proper and frequent cleansing of the bedding. At present the bedding is generally rolled up in the morning and left until night; sometimes it is deposited in a station cloakroom. Could not deserted houses such as are to be found in the neighbourhood of most of the shelters be commandeered by the Government as centres for disinfestation of clothing, and others equipped with washing and bathing facilities for the shelterers? An alternative would be for the bundles to be labelled, collected twice a week, and taken to the disinfestation station of the local council. Another possibility is the use for personal cleansing of the decontamination rooms, fitted with shower baths, at the first-aid posts, which happily, in the absence of gas attack, have not been used for their original purpose. The co-operation of the nurses and orderlies at these posts would also be of great value. The cleanliness of the shelterers themselves and of their belongings is as important as the hygienic construction and equipment of the shelters.

The bunks are gradually, rather slowly, being installed, but often with too little regard for spacing. The tiers might be more widely separated. If another foot or two were added to the uprights the occupiers of the lowest and middle bunks would be able to breathe more freely. In one surface shelter holding 300 it was found that, although the bunks had been fitted in every bay, only one of the bays was occupied, the reason being that walls and ceiling were streaming with water. A hundred yards away there was another (basement) shelter, centrally heated, dry, and comfortable, but without bunks. Some bunks appear to be of a cheap type, of dimensions so meagre that we hear of occupants falling out during the night, the fall in one case causing fracture of the femur. The most urgent matter is the removal of latrines from the dormitory parts of the shelter. There are shelters where people sleep close to the latrines in a stench which is almost intolerable.

The feeding of the shelterers raises other questions of importance. Is the Ministry of Food interesting itself in the nutrition of the shelter population? Are its scientific advisers being put on this job? Is the commissioner responsible for handling this question cognizant of food values? Few medical men would agree that it is sound dietetic policy to give people in such a situation meat extractives, which arouse the appetite and aid digestion but are adjuvants rather than foods. It would be better to substitute preparations which are good sources of vitamin B_1, notoriously lacking in the diet of the poor. We have heard of one large shelter where on a "peak" night one hundredweight of cake is cut up, and another half-hundredweight in the morning. "No bread!" said Marie Antoinette; "then let them eat cake." Cake, with tea, seems to be the fare on which many London workers set out for the day. If the organizations which, from the highest motives, provide food for the shelterers were given some official guidance on the selection of foodstuffs it would be an advantage. A canteen provisioned so far as possible from the nutritive point of view is more necessary than Christmas trees, just as mechanical ventilation and adequate sanitary arrangements are better than a film show. We might add that the engagement of a second nurse on an underground station which accommodates people by the thousand and at present has only one nurse is preferable to the engagement of the services of a professional comedian. This is a hard, unsentimental problem with a vital bearing on the health of the nation.

Evacuation, of course, remains the first remedy for the overcrowding which Lord Horder's Committee described as the crux of the problem. Various reasons have been assigned for the reluctance of parents. One which was mentioned to us by a well-known sociologist was the fear of parents that if they were killed their evacuated children might become "workhouse" orphans in the Dickensian sense of the term, and he suggested that this could be met by a proclamation that such children should be wards of the State. But even if dispersal reached its practicable limit there would still remain a vast population in the shelters, and the immediate question is how far it is possible to remedy existing bad shelters without losing urgent time on reconstruction. If this is not possible they should be closed and new accommodation commandeered forthwith. The problem is to provide at top speed shelters that will protect not only against the uncertain bomb but against the more certain pestilence.

Many present delays seem to be due to a gap between the Ministries and the local authorities. Some of the latter place the delay at the door of the Government, saying that it is not a case for circulars but for consultation, and that the people on the spot are not brought into conference. Many general practitioners in the East End, where the shelter problem is most acute, have ideas on the subject, sharpened by recent experience, and their practical advice might be more useful than that of many experts at a distance. The number of authorities concerned also makes for confusion and delay. At least four Ministries are interested, and among the local authorities themselves there may be such division of responsibility as prevents the job being done quickly or at all. Some shelters are in the area of two or more local authorities, each of which expects the other to take the lead.

The outstanding need is for the appointment at once of a supreme co-ordinator, armed with the requisite

authority directly from the Government. He might be either a medical man or a layman, but it is important that he should be one whose name is recognized by the nation as a man of affairs, able to assume responsibility and to see that his ideas are carried out. Early in October the B.M.A. suggested to the Ministry of Health that a medical man with initiative and energy should be given executive powers to control and co-ordinate the medical side of the shelter problem in all its various aspects. It may be that the unification of control required would be best secured by a layman and a doctor working together in double harness. The appointment should be outside the Civil Service, and the man appointed be absolutely free to select his counsellors and staff. He should have power to go over the heads of local authorities if necessary, to break down vested interests if any such bar his path, to ordain by-laws for the shelters, and to call in the services of medical men, architects, surveyors, contractors, merchants, caterers, and others to whatever extent he requires. There is happily no danger in this country of the calamity which overtook Germany in 1918 when the collapse of the civil population brought on defeat; but the speedy winning of the war depends to an incalculable degree upon the health, security, and serenity of the mass of civilian workers and their families. In what it has published in recent weeks the *Journal*, of course, has had no political motive; the sole matter at issue is the health of whole communities now gravely menaced—a menace the graver because the epidemic months of January and February are upon us. More than a hundred nights of sheltering under conditions resembling in certain respects—though widely different in others—those of siege have created in certain quarters an Augean stable, and some swift, bold, Herculean strokes are demanded for its cleansing.

CHEMOTHERAPY IN CARRIERS

The recent War Office memorandum on the treatment of cerebrospinal fever, to which reference was made in the *Journal*[1] recently, although giving instructions that systematic search for meningococcus carriers should be abandoned, nevertheless advised that any carriers discovered accidentally should be treated with a short course of sulphanilamide. There was then, as we pointed out, no published evidence that this treatment would succeed, and the failure of chemotherapy in streptococcus carriers did not encourage any preconceived belief that an analogous condition would respond differently. Such evidence, however, is now furnished by Major R. W. Fairbrother in a paper on page 859 of this issue. His conclusions are based on the study of three groups of cases each of different nature. The first and much the largest consisted of men undergoing treatment for gonorrhoea: only one man out of 139 proved to be a meningococcus carrier when swabbed after a course of sulphapyridine, whereas the carrier rate in two comparable groups of men not receiving this treatment was 16% and 21%. Secondly, fourteen convalescents from cerebrospinal fever all gave negative swabs, whereas before the advent of chemotherapy it was common for such patients to remain carriers for some months. Finally, thirteen carriers all lost their meningococci after four days' treatment with sulphapyridine. In the first and third groups post-nasal swabs were apparently taken immediately at the conclusion of treatment—while, indeed, the drug may still have been present in the nasopharyngeal secretion. It would perhaps be worth while in future studies to swab again after an interval of some days in order to determine with certainty that the infection has been abolished and not merely suppressed during treatment. The drug used in all these cases was sulphapyridine; it would be interesting to know what effect sulphanilamide has when used in this way. The two drugs are treated as almost equivalent alternatives in official memoranda, and if there is any purpose for which one is effective and the other not this should be made clear. These findings have certain wider implications. It has hitherto been believed that sulphonamide compounds act effectively only on bacteria which are invading the tissues. This belief is justified not only by much clinical experience but by two important theoretical considerations: the greater vulnerability of actively multiplying bacteria; and the greater concentration of the drug in the blood, which is freely supplied to an inflamed area, than in surface secretions or exudates. These are only matters of degree, and it may be that a greater susceptibility in the meningococcus itself outweighs these drawbacks to the successful treatment of a chronic superficial infection. But whatever the explanation the fact that a carrier state can rapidly be cleared up by chemotherapy will demand some revision of existing ideas. It also encourages attack by the same means on other carrier conditions. There is perhaps little *a priori* reason for anticipating success in any of these except the carrier of typhoid. Here the gall-bladder is the main focus of infection; sulphanilamide is known to be excreted in the bile, and has been shown to influence experimental infection with *Bact. typhosum* in mice, although admittedly its effect on typhoid fever in man has not been found to correspond. A study of its effect on the typhoid carrier should be undertaken.

[1] *British Medical Journal*, 1940, **2**, 634.

RATIONALIZATION OF THE BRITISH DRUG INDUSTRY

The Third Addendum (1941) to the *British Pharmacopoeia*, 1932, marks the end of the first year of war and of the preparation by British chemists and manufacturers of essential synthetic drugs for which we were previously dependent on German supplies. In this department, as in so many other sections of our war effort, no patriotic Englishman can look back on the last year with complacency or towards the future with equanimity. It has been a year of wasted opportunity, and there is no evidence of any change of heart. The British drug industry resembles the average British woodland, a number of under-developed units crowding each other out of existence, and it has grown up in the same improvident way. Now that the brief period of imitation is over, we must ask ourselves whether any of the competing firms has sufficient staff or resources to embark on the discovery and marketing of new drugs. Marketing, sales service, a famous name, the prestige of a vast industrial organization—all these are almost as important as discoveries. A man needs to scour the advertisement pages of his journals very carefully to find the names which the British Pharmacopoeia Commission has advised us to use for these drugs of German origin, for they are usually disguised behind proprietary synonyms. Why should the practitioners of the world remember that hexobarbitone, hexanastab, and cyclonal are all names for the drug first known as evipan? They might remember one new name, if the war lasts long enough, but certainly not a number. They will rather remember the name of the firm which gave the world atebrin, avertin, Bayer 205, prontosil, and the rest, and which has a well-developed sales organization

in every quarter of the globe. The narrow competitive spirit, which expresses itself in an excess of British brand names, had shown itself before the war in relation to drugs such as mandelic acid and stilboestrol, which were the outcome of work in university laboratories to which the drug houses had made no contribution whatever. Discoveries such as these, to which we may add sulphapyridine, sulphathiazole, and the new trypanocidal drugs of the guanidine and amidine class, show that English workers are capable of great chemotherapeutic skill. The Medical Research Council has an ambitious programme of chemotherapeutic research, and it is due to its initiative and drive that the drugs in the Addendum have been so quickly made available in this country. Our commonwealth of nations forms a vast market which at present suffers from gross under-consumption of essential drugs. Soon after the outbreak of war the Board of Trade decreed that every industry must organize itself for export trade. Despite all this, the British drug trade remains a complex of belligerent minor States. Not a tithe of the enterprise has gone into its organization that has gone into the patent medicine business. Some form of rationalization must be carried out before the end of the war, by nationalization, financial merger, or a system of cartels. People who do not make order by their own efforts may have a new order forced upon them.

A RAPID SPINAL FLUID FLOCCULATION TEST

Although flocculation tests have proved valuable additions to the Wassermann reaction and are generally more sensitive for blood examination, especially in treated cases of syphilis, they are not as sensitive and specific in examination of the cerebrospinal fluid. The appearance, therefore, of a rapid flocculation test for syphilis adapted to cerebrospinal fluid[1] is opportune, especially since it appears to equal in every way the complement-fixation test and is more economical of time and material. Such a reaction, if the claims made for it are substantiated, should prove useful not only in confirming the Wassermann reaction but also in cases in which the fluid is anti-complementary. Varying amounts of cerebrospinal fluid are added to 0.02 c.cm. of a suitable antigen suspension and the mixture is shaken. It is then incubated for four minutes at 56° C., shaken for four minutes, and then subjected to centrifugation for four minutes at 1,800–2,000 r.p.m. The supernatant liquid is removed, leaving 0.15 c.cm. of the mixture, which is shaken and decanted on to a glass slide. The result is read under low-power magnification. The antigen suspension is essentially Laughlin's reagent—that is, Kahn's stock antigen to which scarlet red and compound tincture of benzoin are added. It is made up with 2% saline but no electrolyte is added. The reaction depends upon the fact that lipoid particles become coated with reagin and are then agglutinated by centrifugation. It is a simple one to carry out and pathologists are advised to give it a trial.

VITAMINS IN RHEUMATOID ARTHRITIS

The importance of a high content of the principal vitamins in the diet of arthritics is now generally recognized. The value of vitamin D in improving calcium metabolism has long been appreciated on experimental as well as clinical grounds. Deficiency of vitamin C in the blood of rheumatic patients appears to be usual, and in severe rheumatoid arthritis may approach the scurvy level. This is apparently due to a greater metabolic demand, since much larger quantities must be given to raise the blood content than would be required in normal individuals. Investigating the vitamin A content in patients suffering from various rheumatic conditions Race[1] noted a very low level in rheumatoid arthritis, while Ellison and Moore[2] found a low level in the livers of children who had died from rheumatic valvular disease. Race's observations were made by the light-extinction method. Hall, Baylis, and Soutter[3] have recently investigated metabolism of the vitamin A in rheumatoid arthritis by the biophotometric method, which is based on the night-blindness characteristic of vitamin A deficiency. It was found that patients with rheumatoid arthritis showed much higher average dark-adaptation curves than did controls, and that the biophotometric readings roughly paralleled the increase in the sedimentation rate. Compared with controls they required an abnormal amount of vitamin A, as they did of vitamin C, to make good the deficiency, which in such cases may be due either to increased utilization or to deficient absorption. In patients receiving adequate vitamin A therapy no obvious clinical improvement that could be attributed to the vitamin was noted, but it would seem certain that increased resistance and a higher level of general health would be achieved by correcting such deficiencies.

[1] *Amer. J. clin. Path.*, 1940, **10**, 527.

THE LIVER IN PANCREATIC DISEASE

It has been known for some years that pancreatectomy in dogs leads to death from fatty infiltration of the liver, even if the concomitant diabetes is controlled by insulin. This was shown in 1924 by Fisher[4] and by Allen, Bowie, MacLeod, and Robinson,[5] who were able to prevent the hepatic lesions by feeding raw pancreas to the animals. More recently the constituent of the pancreas active in this respect has been identified with choline by the Best[6] school, although Dragstedt[7] claims that some other unknown constituent of his "lipocaic" (alcoholic extract of beef pancreas) is responsible. Have these findings any counterpart in human pancreatitis? Two recent papers suggest that they have. Snell and Comfort[8] report three cases of fatty liver in patients suffering from chronic pancreatitis associated with calculi in two and multiple cysts in one. The clinical manifestations included foul fatty diarrhoea with high unsplit fat, enlarged liver, and positive results with certain liver-function tests. Cole and Howe[9] have collected two further cases from the literature and added one of their own, complicated, however, by a jejuno-colic fistula. Of these six cases three came to necropsy, and three are said to have improved on treatment with "lipocaic." It may therefore be accepted that any chronic pancreatic disease of sufficient duration and extent may cause severe fatty changes in the liver. It hardly seems necessary to describe this as a new pancreatico-hepatic syndrome, and we cannot agree with Cole and Howe[9] that the condition is related to the group of diseases described as coeliac disease, idiopathic steatorrhoea, Gee-Thaysen's disease, etc., in which there is no evidence of pancreatic dysfunction. According to a recent paper by Bennett and Hardwick[10] the cause of this latter condition is to be sought in "chronic jejuno-ileal insufficiency," a hypothesis which is in accordance with the known facts even if it leaves the more remote aetiology undetermined.

[1] *Rep. chron. rheum. Dis.*, 1937, **3**, 30, London.
[2] *Biochem. J.*, 1937, **31**, 165.
[3] *New Engl. J. Med.*, 1940, **223**, 3, 92.
[4] *Amer. J. Physiol.*, 1924, **67**, 634.
[5] *Brit. J. exp. Path.*, 1924, **5**, 75.
[6] *J. Physiol.*, 1933, **79**, 94.
[7] *J. Amer. med. Ass.*, 1940, **114**, 29.
[8] *Amer. J. digest. Dis.*, 1937, **4**, 215.
[9] *Surgery*, 1940, **8**, 19.
[10] *Lancet*, 1940, **2**, 381.

Reports of Societies

CAUSES OF FAILURE IN TREATMENT OF OTITIS MEDIA

At a meeting of the Section of Otology of the Royal Society of Medicine on December 6, with Mr. LIONEL COLLEDGE in the chair, the subject of discussion was the causes of failure in the treatment of acute otitis media.

Mr. T. B. LAYTON said that the vast majority of cases of otitis media got well by themselves, and the task of getting the remainder well was largely a nutritional problem. Chronic otitis media occurred only in communities where nutrition was deficient in both calories and vitamins. The first cause of failure in the treatment of the acute condition was the way in which paracentesis was still repeatedly done in the early stage. Paracentesis should never be performed in the acute invasive stage. A second cause of failure was the use of wet preparations, encouraging the growth of organisms in moisture. The use of any antiseptic which left the external auditory meatus moist favoured the passage of organisms into the middle-ear cleft. A third cause of failure was a matter of toilet—the hair was too often allowed to encroach upon the operation wound. Insufficient attention was also paid to the nasopharynx. Final recovery in these cases depended upon Eustachian drainage, and the prevention of recurring infection from the nasopharynx was an important factor. He laid stress on posture as a therapeutic measure. The patient if possible should be in the erect or semi-erect position. Further, in order to ensure Eustachian drainage the child must be made happy. A child with a stolid face could not be made well. With every movement of the face, with the exception of crying, the soft palate came up and down again, and for a short period exerted a negative pressure upon the nasopharynx. There was also need for increased circulation through the inflamed area which could only be obtained by active exercise, the best form of which, in his opinion, was skipping.

Mr. MUSGRAVE WOODMAN instanced four group causes of failure: (1) persistent suppuration in the Eustachian tube, probably owing its origin to sinus infection; (2) unexpected and undiagnosed mastoid involvement; (3) ossicular disease; (4) tuberculous disease. Mr. J. DOUGLAS MCLAGGAN said that everyone had experienced the dramatic relief of pain and stress which paracentesis could give, but there was not the same unanimity as to the indications for its performance. Before paracentesis was done there must be a sincere attempt at diagnosis, and if there was no pus present the operation should not be done. There seemed to be an optimum time for paracentesis, and this must be awaited, although its determination in middle-ear infections might not always be easy.

Mr. F. C. ORMEROD added a fifth to Mr. Woodman's four causes of failure—namely, mismanagement in treatment. To allow an abscess to remain and cause pain in the middle ear was mismanagement. Mr. W. I. DAGGETT said that when the drum was merely red, the landmarks easily seen, and the hearing good a paracentesis should not be performed, but at a later stage, when there was actually pus in the middle-ear cleft, with a red bulging drum and diminished hearing, undoubtedly there was a call for paracentesis. Mr. C. HAMBLEN-THOMAS endorsed Mr. Layton's remark about taking the hair away from the site of operation. This was obvious enough in middle-ear cases, but it also applied to chronic external-ear infections which did not clear up so long as there was a seborrhoeic condition of the scalp.

Mr. R. G. MACBETH said that the crux of the matter in any persisting otorrhoea was that the middle ear was acting as a drainage tube for either the mastoid process or the Eustachian tube. Usually, but by no means always, it could be decided whether the mastoid processes needed attention, but the Eustachian tube aspect was not so easy. He added that he had lately adopted a method advocated by some Danish observers of using gentle irrigation with 20% alcohol. This made it unlikely that anything would be carried into the tympanum, and it had no irritating effect. Mr. TERENCE CAWTHORNE said that the general principles in treatment were warmth, rest, drainage, and removal of cause. Some form of fomentation or hot electric pad should be used. All patients in the early stages of acute otitis media should be in bed, and preferably in the prone position. The mere presence of fluid in the middle ear was sufficient to warrant paracentesis.

After some further discussion, Mr. LAYTON, replying, said that he was taught by his seniors that paracentesis should be performed at the earliest possible moment. He believed this to be pathologically unjustifiable. This was the only part of the body in which it was considered right to incise an acutely inflamed area which was not yet localized. A good deal turned upon the interpretation of the word "pain." If a child had one restless night with crying and early the following evening appeared likely to have another a paracentesis should be performed, but if the child merely whimpered and then went off to sleep its pain was not such as justified intervention.

TREATMENT OF WAR WOUNDS

A historical survey of the treatment of war wounds was given in a paper by Mr. A. DICKSON WRIGHT to the Royal Society of Arts on November 27. Mr. Wright opened with the rather cynical observation that the medical profession had actually made war more evil than it would otherwise have been. In the old days, he said, all wars ended quickly in a spate of dysentery, which so occupied the contending parties that peace terms were not too vindictive, but now epidemics were so well controlled that they did not interfere with the fighting, which went on "until a psychological epidemic brings it to its dreary end." Every great war had produced its notable military surgeons. He instanced the work of Ambroise Paré in the feudal wars of the sixteenth century, of Larry in the Napoleonic wars, and of Winnett Orr in the 1914–18 war. Trueta in the recent Spanish war extended the Winnett Orr method still further. Trueta's results had soon found confirmation in the present war. For example, a convoy of sixty dreadfully wounded men arrived from Dunkirk with wounds which at a previous time would have meant the death of perhaps fifteen and amputation for about another fifteen, but, owing almost entirely to immobilization in plaster-of-Paris, only two had died and no amputations were carried out at all. At the present time, said Mr. Wright, the surgeon felt himself at last "on top of this wound question" save in one respect—namely, the matter of shock. He concluded with a graceful tribute to the part played by the nurse in the treatment of the patient. The various wars of the past, he said, had produced their Parés, Larrys, McGregors, and Truetas, but the Crimean War produced Florence Nightingale, who established the sympathetic and rational care of the wounded. Many cases of multiple wounds to-day only pulled through owing to the common sense, humanity, and genius of the nurse.

The latest report of Dr. S. W. T. Lee, senior medical officer-in-charge, Zanzibar, shows that health services for women and children are expanding. The women's clinic is crowded every day with 150 to 200 women, and in four country dispensaries the same work is carried on. The women medical officers are well received in the villages, and appear to have gained the confidence of the people. Routine medical and dental treatment is given to all school children, all of whom, however, suffer from nutritional defects. School feeding in certain places over a three-monthly period resulted in improved weight, height, and health, but the Government is unable to finance the adequate feeding of all school children. In default of anything better the director of education has been giving them a small meal of beans and sugar each day. This policy, the report admits, is only one of treating the symptoms of the disease, but the hope is expressed that war plans for increased production may result in healthier children. The work of ante-natal clinics in Zanzibar has steadily increased, and out of nearly 1,300 cases dealt with there was only one death—that of a woman suffering from puerperal sepsis who had been delivered by a "handy woman" in the country.

Correspondence

Convulsion Therapy in Out-patient Department

SIR,—I read the title of the paper by Dr. E. B. Strauss and Mr. Angus Macphail (December 7, p. 779) with foreboding, having expected that some such account would soon appear. This letter is written not only (*a*) because I disagree with the use of convulsion therapy in the out-patient department and consulting-room, but also (*b*) because I feel that when it is supported by physicians of influence it will lead to extensions which can only retard progress in the treatment of mental illness.

If the patient's welfare is the only consideration I cannot believe that it is to his benefit to be treated in the out-patient department or consulting-room. Patients undergoing convulsion therapy should have attention by nurses trained in observing mental disorder, and a psychiatrist should be within easy reach. Everyone with experience of convulsion therapy has seen quiet patients become extremely restless and violent, sudden and unexpected exacerbations of symptoms, and a complete change of mood within a short space of time. Depressed patients frequently become hypomanic before recovery, and I have seen a melancholic quickly become grandiose and homicidal during treatment. On the other hand, the hypomanic patient may swing over to depression. Case 2 quoted by Dr. Strauss illustrates this, and there will inevitably be suicides if supervision is not given in these cases. In addition, personal contact is a most necessary part of convulsion therapy. A good nurse will produce much better results than an indifferent one. It seems unlikely that as good results will be given by treatment in the environment where the patient's illness began, as when the patient is separated from his home surroundings. On the other hand, if the use of convulsion therapy in the out-patient department is employed for teaching, it is, I believe, in many cases exploiting patients for the students' interest. One cannot in this case say they benefit, for they learn no more than by seeing some rare major surgical operation, which will probably be useless to them in their future work. Apart from this, their impression of mental treatment is distorted.

Two points in Dr. Strauss's technique should, I think, be questioned. The first is the rapid return home after treatment. From the cases I have seen, which have had electrically induced convulsions, half to one hour is too short a time for rest following the fit. This certainly applies to phrenazol (cardiazol), triazol, and ammonium chloride convulsions, and the severity of the amnesia and the inclination to sleep after the fits produced by the electrical method are no less. The sleep following an epileptic fit is a physiological requirement, and I see no reason why it should not be equally necessary after an artificially induced convulsion. The second point is that the clothing was not removed (not even the shoes). This restricts movements, and I believe, in company with Good (*Lancet*, 1940), that fractures are largely caused by the restraint given by those attending the treatment. The authors do not mention how much restraint is employed.

A serious development which is likely to follow the use of convulsion therapy in the out-patient department and consulting-room is the extension of its use to cases in the general hospital and nursing home. The general hospital is not the place for the treatment of even mild uncomplicated mental illness. Nurses untrained in the nursing of psychiatric patients are not competent to report upon the signs and behaviour of the cases or to aid them in their recovery by adopting the correct attitude to their illness. The house-physician has not the experience required for dealing with them—for example, in the use of psychotherapy, the recognition of the degree of a depression, or the employment of sedatives. In addition the general hospital has not the facilities for exercise, recreation, and occupation which are provided by a hospital built for the reception of cases of mental illness. General nursing homes used for the treatment of these cases offer much the same objections, except that the disadvantage can be considerably amplified.

Electrically induced convulsions are more tolerable to the patient than are those produced by drugs. This advantage is in itself a danger, in so far as few patients would remain in a general hospital or nursing home or attend the out-patient department or consulting-room for a course of cardiazol treatment, although they will submit to electrically induced convulsions in these places. I am not advocating that these patients should be treated as voluntary patients in the admission villas of mental hospitals. As things are now very few have suitable accommodation for mild cases of mental illness, and a stigma still remains, but, in time, with better classification of patients and education of the public, these objections will be largely removed (Pentreath and Dax, *Journal of Mental Science*, 1937). Even then hospitals for voluntary patients (of which the Maudsley is the best example) and larger observation wards which are adequately staffed will probably fulfil the requirements of these patients in the urban areas better than will the mental hospital.

Finally, Dr. Strauss and Mr. Macphail do not stress the dangers of this form of treatment. If a patient's depression, for instance, is so mild that he can be treated as an out-patient without risk, is it justifiable to use a method on him which has produced 10% of fractured vertebrae in one series of cases?—I am, etc.,

E. CUNNINGHAM DAX.

Netherne Hospital, Coulsdon, Dec. 12.

Epidemic Influenza

SIR,—It is almost exactly 200 years since the Italian name "influenza" first came to England. In its epidemic form this disease has perplexed the minds of medical men since the "English sweats" gave epidemiologists of the sixteenth century opportunities for conjecture. Since last autumn your *Journal* has seldom been free from some comment or query on the subject of influenza in its relation to war and the possibility of a recurrence of the 1918 pandemic. In your leading article on immunization against influenza virus A (November 9, p. 632) you state: ". . . influenza A may well play an important part in the outcome of the war." In his article on epidemiological reflections on the air war (November 16, p. 677) Prof. M. Greenwood sets out to foretell the variety and extent of infections arising in this country during this winter as a result of the new living conditions imposed upon city dwellers by the war. He is "vaguely uneasy" about the possible effects of overcrowding, and hints (with reservations reminiscent of our Sunday newspapers' horoscopic divinations) that some sudden alteration in the tenor of our lives—such as by movements of population or by sudden weather change—may (as happened to his herds of laboratory mice) precipitate a major epidemic catastrophe, possibly a pandemic influenza.

Now the epidemiological forebodings of so eminent a statistician as Prof. Greenwood are of considerable importance, and since epidemic influenza is still "the crux of epidemiology," I feel justified in making some observations on the subject. First as to overcrowding. In his book (*Epidemics and Crowd Diseases*, 1935, p. 326) Prof. Greenwood affirms in reference to the 1918 influenza epidemic in this country "that our conclusion that domestic overcrowding was not a sensible factor of the spread of influenza has not been invalidated by any subsequent discovery."

Then as to forecasting. The prediction of epidemics of respiratory infections such as influenza, whether by a study of the vagaries of sun-spot periodicity or changes in the surface level of the Caspian Sea, or by noting the advances and retreats of the glaciers in the Alps, or even by the more credited method of statistical probing, does not constitute a safe betting proposition. I recall hearing Prof. Greenwood confess of mathematical philosophers, "When we don't know what we are talking about and don't care whether the statements we are making are true or not we are mathematicians." I am tempted to quote here an apposite iambic verse:

> Thy skilful hand contributes to our woe
> And whets those arrows which confound us so ;
> A thousand torments in thy symbol sit,
> While snaring snoods thy restless fingers knit.

All the serious epidemics of the past have come with unexpected suddenness and always found us surprised and

unprepared. That is what makes epidemiology such a fascinating and elusive art.

During the past two years there has been much argument on what exactly is meant by "influenza." Dr. Stuart-Harris and his co-workers (Medical Research Council Special Report No. 228, 1938) have retarded a simple understanding of the disease by their dogmatic insistence on a strict limitation of the diagnosis influenza to those cases in which a ferret-infecting virus aetiology has been unequivocally demonstrated serologically or experimentally. Clinically and epidemiologically there are no substantial differences to be observed between "virus influenza" and what these authors call "acute upper respiratory catarrh." It was only when these workers (*Lancet*, February 3, 1940, p. 205) themselves encountered epidemics of undoubted clinical influenza, but in which Laidlaw's virus was not demonstrable, that they yielded from their didactic classification, though some of us had earlier pleaded for the recognition of an endemic clinical influenza not due to any known virus. Dr. R. E. Smith (*Lancet*, April 13, 1940, p. 718) makes an eloquent plea for the retention of the name "influenza" for the well-known clinical entity, whatever its aetiology, and suggests "Laidlaw's influenza" as a subtitle for the virus variety.

Insufficient recognition has been given in this country to the significance of the experimental observations of American workers that the common nasopharyngeal bacteria (streptococci, pneumococci, *Haemophilus influenzae* Pfeiffer) when added to influenza virus produce a much more severe and infectious disease than can be produced by virus alone. The enormously increased virulence of the secondary waves of the 1918 and earlier epidemics strikingly shown by Prof. Greenwood (*Journal*, November 23, 1918) and others (Medical Research Council Special Report No. 36, 1919) may possibly be accounted for by this synergic antigenic partnership between virus and a second organism. There is now a well-established and standardized technique (by virus neutralization tests) for measuring in a patient's blood the titre of antibody to Laidlaw's influenza virus. The degree of immunity (and therefore the incidence of recent infection) may be determined in a particular population at any time by estimating the range of titre of antibody in blood samples. If it be assumed that pandemic influenza is caused by "virus A," then periodic measurement of antibody titre in the blood of a given population (it could be done on samples of blood collected in the district for the Wassermann reaction, etc.) would reflect accurately the state of immunity and therefore of infection—subclinical or patent—by influenza virus. A progressive rise in antibody titre in any particular area would forebode an impending epidemic. The distribution within the country or hemisphere of rising titre would point the direction of spread of an epidemic.

This seems to me a method of "forecasting" virus A influenza epidemics which is administratively simple, and much more reliable than watching Sir William Hamer's "precursor" outbreaks of disease on the rising slope of an influenza wave. It would also enable public health authorities to follow Sir James Mackenzie's dictum to "resist the beginnings of disease," by the newer methods open to them, such as prophylactic inoculation with formolized virus vaccine.

The suggestion of Dr. W. N. Pickles (December 7, p. 803) to apply a system of maritime quarantine to vessels approaching our ports during a continental prevalence of influenza commends itself as a sound peacetime measure, and was in fact highly successful in its application in the U.S.A. and Australia during the 1918 and 1919 epidemics (E. O. Jordan: *Epidemic Influenza*, 1927, p. 456). The recently mooted idea to minimize nasopharyngeal infections in public air-raid shelters by making users of such shelters wear gauze face masks is not a sound practical proposition. Face masks are not comfortable or convenient, though undoubtedly efficient bacterial filters when used under controlled conditions. The effect of mask-wearing by the general community cannot be expected to rank as a prophylactic measure of any value.

The prevention of spread of epidemic influenza can only be attained by the rigid isolation for the infective period of all known cases.—I am, etc.,

Leeds, Dec. 8. WILLIAM HARTSTON.

Benzyl Benzoate Treatment of Scabies

SIR,—I was much interested in the article by Surgeon Lieut. R. Ernest King (November 9, p. 626) and the letter by Dr. Clara M. Warren (November 23, p. 723) on the above subject. The problem of treating scabies is that with in-patients one can see that the treatment prescribed is carried out thoroughly and therefore effectively, whereas with out-patients one has to rely on the treatment being properly done by the patients themselves. As it takes the ovum of the *Acarus scabiei* two days to hatch out, if one single ovum or acarus is left intact by treatment then the labour of clearing things up is in vain.

The acarus is a cave-dweller, inasmuch as it hides itself and its progeny in burrows in the epidermis and causes a nocturnal irritation. To get at it one has to open up these burrows by a preliminary good scrubbing and wash with soap and water. Soft soap is advocated in preference to hard soap, because it is an oleate or stearate of potash, while hard soap is a similar compound of sodium. Potash is a much better and stronger keratolytic than soda: in other words, it is a better medium for dissolving and softening the protecting epithelium of these burrows, and so allows easier access of the antiparasitic remedy to the acarus and its ova. (The keratolytic property of potash is well shown when one removes an acarus from its burrow for confirmatory evidence of scabies, and places it in a solution of potassium hydroxide on a microscope slide for examination this way. It will be seen that the potassium hydroxide solution quickly softens the keratinous body of the parasite as well as any epithelial scales, etc.) I often wonder from personal observation and experience whether, provided a real, thorough scrubbing is indulged in, all acari and ova being exposed to the thorough action of soft soap and water, then freely washed off and removed by clean water, and infected clothes being suitably disinfected, any further application is necessary. However, as this criterion of perfection is hard to be sure of, particularly when one has to rely on the average hospital out-patient to carry it out, one must apply some local antiparasitic as well to complete the work already begun.

Having tried different remedies, I have come to the conclusion that the only reliable method is to use that selected for three days' continuous application, with disinfection of all underclothes and bed-coverings. My usual routine for out-patients is a thorough wash, as above, then a quick dry down, followed by application of the medicament to all affected parts night and morning for three successive days (during which time no baths must be taken). At the end of this period a bath is again taken, all medicament washed off, and clean clothes put on. Sulphur, β-naphthol, balsam of Peru, benzyl benzoate, and mitigal have all been satisfactory, but I have found that three days is the only safe minimum for out-patients. McKenna states ten days for mitigal as the requisite period, but this appears unduly long in actual practice. (Mitigal is unobtainable now, and benzyl benzoate is a very close second in this respect, so that one must fall back, perhaps temporarily, on some of our former antiparasitic allies.)

An ointment strength of 10% sulphur for adults, 5% for children and adults with an easily irritated skin, and 2½% for infants, is a very good and easily remembered working rule. It is very useful from a practical point of view also, as one often is confronted with, say, two parents, their son and/or daughter (children), and the baby aged, say, 6 months, and one jar of ointment can be prescribed for all, to be suitably diluted down 50% each time for the younger members. The strengths of sulphur may often be advantageously decreased by combined β-naphthol and/or balsam of Peru with it, thus diminishing the tendency to sulphur dermatitis. One further dispensing point: it is better to make the ointment base up with equal parts of adeps and paraffin molle, as this produces a more easily smeared on ointment. The formula used by me for benzyl benzoate is benzyl benzoate ℥jss, spirit. sap. mollis (*B.P.C.*) ℥ijss.

It is well known that many of the lower animals, particularly the dog, cat, horse, sheep, pig, fox, and also poultry, suffer with various varieties of sarcoptes or acari, and in some instances the parasites may be transferred to man. Lastly, I

might point out, from recent practical experience, that the typical textbook type of scabies appears to be decreasing. One is often confronted with non-typical cases, in which the best method of sure diagnosis is to find an acarus and/or ova in one of the suspected lesions and then examine it under the microscope for confirmation.—I am, etc.,

Leicester, Dec. 9. F. A. E. SILCOCK.

Tuberculosis in Pregnancy

SIR,—Dr. G. Payling Wright (November 23, p. 721) raises the important problem of the effect of pregnancy on consumptive women, which is the subject of a clinical investigation now being made at this sanatorium. A maternity unit is attached to one of the pulmonary wards, and up to the present time the effect of pregnancy on thirty-nine tuberculous women has been observed. Eighteen of these patients were under 25; the highest age of the remainder was 36. It was found that eleven patients were admitted with active and twenty-eight with quiescent disease; included among the latter were eleven patients admitted with an artificial pneumothorax, and one who had had a successful total thoracoplasty. No adverse effect of pregnancy, labour, or puerperium was observed on any of the patients whose disease was quiescent. Of the eleven patients whose disease was active on admission, three showed evidence of retrogression, in three others the disease became quiescent, and in five there was no change.

Cases proposed for admission are reviewed in consultation between the tuberculosis officers of the Essex County Council and Dr. Burton Wood, consultant physician for pulmonary tuberculosis. We are informed that there has been very little rejection of cases, and that cases admitted represent a fair sample of pregnant tuberculous women. Our results, which do not at present include sufficient cases to justify final conclusions, will be the subject of a paper in due course, but we feel that this short preliminary note lends clinical support to Dr. Wright's statistical review.—We are, etc.,

R. C. COHEN.
The Sanatorium, Braintree, Dec. 7. ALAN GRANT.
M. C. WILKINSON.

Air-raid Casualties

SIR,—It is clear that many plans made in peacetime have proved unsatisfactory in working under war conditions, and not least is this true of the arrangements made to deal with air-raid casualties. The Ministry of Health recognizes this fact, and from time to time has issued circulars changing in one detail or another the scheme originally drawn up. It is impossible for any one rigid plan to apply to the whole country, for it is essential to take into consideration the varying needs of such different areas as the London boroughs, the large provincial cities, the smaller towns, and the rural districts, each of which present different problems and need their particular scheme. The needs of a London borough, every part of which is within a few minutes by ambulance of a hospital and a surgical team, are very different from those of a country district, where the population is thinly scattered over a large area.

The latest circular, which appeared in the *Supplement* of November 16 (p. 41), makes an alteration which is probably suitable for those areas which are only rarely subject to enemy raids, and where casualties, if they occur, will be few. In London, however, incidents are often numerous, and there are frequently casualties in different parts of the same district at the same time. The mobile unit on duty will no doubt be sent to the incident first reported, and these casualties will have the benefit of immediate medical attention. To a second incident a doctor must be summoned. This must necessarily take some time, as first the warden must report to Control, Control then orders out the unit, and then has to summon the doctor, who has to travel to join the unit. The time may easily be considerably increased by telephonic breakdown, or by delay on the part of the doctor, who may be unable to respond immediately for one of many good reasons. Meanwhile these casualties will have to rely for their first-aid treatment on the stretcher-bearers, who, while exceedingly efficient, are not trained in diagnosis nor able to relieve pain and shock by an appropriate injection.

If a doctor is of any service in first aid, and we must believe that he is, his service is undoubtedly greatest at the earliest possible moment. From now on, however, only one doctor in each area will be available for immediate service to the wounded, so that only the first reported casualties, not necessarily the most numerous or severe, will have the benefit of medical attention at this most important stage. It is, however, very doubtful if such a large number of assistants is necessary in the case of mobile units. It would appear from experience in the intensive raids of September that little actual first-aid work is done by the majority of the staff, most being done by the doctor with the assistance of one or two of the most experienced, after which the patient has been taken over by the ambulance drivers and removed as soon as possible to hospital or, more rarely, to a fixed aid post.

Realizing this, we in Deptford, when risk from bombs or shell splinters has been particularly severe, have gone out in a small car with modest equipment and a few of the staff. No particular difficulty has been experienced, and the experiment, having received local approval, has now become the rule. So far it has not been necessary to send back for more helpers. It is, however, unlikely that such a scheme would serve areas where hospitals are less readily available, and where, consequently, more deliberate surgical measures must be undertaken on the spot. Here no doubt more assistants would be required. No one plan will suit the requirements of all areas. The solution must surely be to allow each scheme-making authority to work out its own scheme, in close collaboration with neighbouring authorities, and limited in its expenditure to a sum proportional to the population for which it is responsible. In the drawing up of these schemes there must be adequately represented those who actually do the work and know, not only the nature of the task, but also the capabilities of those who will be called upon to do it, so that public money may not be wasted on apparatus which is elaborate and showy but of no practical value.—I am, etc.,

London, S.E.4, Dec. 12. H. D. MCILROY.

Shelter Dictator

SIR,—In recent weeks your leaders and correspondence have both been full of interesting and helpful comments concerning shelter problems. It is your last leading article on this subject (December 7, p. 790), in which you end by demanding a "shelter dictator for the whole of the metropolitan area," that has compelled me to set on paper this disapproval of such a policy.

The responsibility of "shelter diseases" should be preeminently shouldered and they should be fought against by the medical profession, both as a body and as individuals; it is time we faced our social responsibilities. Doctors appointed to definite shelters ought to be the persons with the necessary local knowledge of the needs of the shelter itself and of the inhabiting personnel, which would be unknown to the doctor you propose to appoint. Besides which, through the Orders in Council passed since the outbreak of war, the Government has power to cut through all red tape and can control everything and everybody. Therefore, why imagine that by appointing a dictator, especially if we are fighting to remove dictatorships from the whole of Europe, we would improve or solve our difficulties?

It is up to us doctors to demand proper and adequate prevention both of injuries and of shelter diseases, for is not prevention better than cure? For a leading medical journal to demand a dictator to deal with these health problems is to mislead the British people and would not, I am sure, represent the views of the whole of the profession.—I am, etc.,

Pontypool, Monmouthshire, Dec. 7. A. S. JARMAN.

Euthanasia

SIR,—The many abuses to which the introduction of euthanasia would give rise are very obvious; besides, human life is sacred, and there is for Christians the sixth commandment. The problem of the incurable person in pain can be very simply overcome by the giving of morphine in adequate doses and as frequently as necessary, and if it shortens life

the object has been to prevent pain and not to kill. The doctor need not stand helplessly by; in fact, there will be very little need for him to see the patient frequently, having once explained the treatment to the nurse attendant or intelligent relative. The physician would have to see that his instructions were efficiently and carefully carried out, and emphasize the potency of the drug. A difficulty might arise where the patient could not take the drug orally and there was no suitable person constantly available to give it hypodermically. Then the patient should go to hospital, and I cannot imagine any patient under such circumstances declining to go if by so doing freedom from distress was guaranteed. The essential point is the prevention of pain and suffering, and not the shortening of life deliberately.—I am, etc.,

Blackburn, Dec. 9. D. KELLEHER.

SIR,—I was very glad to see the letter from Dr. F. Parkes Weber (November 30, p. 766) on the question of euthanasia. While it may no doubt be true, as he points out, that the actual "act of dying" is not always so terrible to the dying as is often supposed, yet nevertheless there are cases of extremely painful incurable disease in which the patient longs for artificial release from severe suffering. For such cases, says Dr. Parkes Weber, he would join himself to those who wish to see the law altered so that, with properly considered limitations, painless death might be administered.

This, of course, is what the society which I represent is agitating for, and I may mention that we are receiving a most encouraging and steadily increasing measure of support from people who count and whose opinion is bound to carry weight. Since our Bill came before the House of Lords in 1936 my society has compiled a list of distinguished supporters and sympathizers, and the new edition which we are about to issue will contain upwards of 850 names of men and women who have achieved distinction in their respective spheres of life. Not least in importance is the fact that our Church group is steadily, even if somewhat slowly, growing.

It is unlikely that we shall be able to bring forward our Bill again until after the war is over, but when peace is again restored the question of the legalization of voluntary euthanasia is certainly one of those which will have to be considered. As to the number of cases which would be qualified, on medical grounds, to come under the Act, I would suggest that this is likely to be much greater than Dr. Parkes Weber seems to think. The great majority would no doubt be cases of malignant disease, and in this connexion I would observe that in spite of all that has been achieved by modern medicine, surgery, and radiology the actual number of persons dying from cancer to-day is, in proportion to population, at least twice as great as it was thirty or forty years ago; it is now over 60,000 a year for England and Wales, or one in seven of all deaths over the age of 40 years.—I am, etc.,

C. KILLICK MILLARD,
Leicester, Dec. 1. Hon. Sec., Voluntary Euthanasia Legalization Society.

Fear and Disease

SIR,—Mr. H. Caiger's letter (November 30, p. 762) tempts me to ask leave to encroach on your space with a few comments on a diffuse and difficult subject. If the medical profession is to play its full part in social "reconstruction," one of its aims must be to clarify, from an anthropological viewpoint, the complex factors contributing to collective fears. Mr. Caiger, in raising this subject in relation to the practice of ophthalmology, has touched upon a pertinent field illustrative of the paradox that, desirable though it may be for the medical specialist to eliminate fear, his competitive subsistence in an economic society has now come to depend largely on his tactful abstention from doing so.

The "eye" has become within the past ten to twenty years one of the most fertile fields in medicine for the play of collective emotional apprehensions, a fact which is understandable when it is considered what a profound part is played by the contrast between Light and Darkness in the basic concepts of so many religions. In our present transitional age of "blood and iron," dominated by all the sensationalism, superstition, and suspicion that accompany the deification of science, it is very difficult for the medical profession not to be entangled in the vortex of prevailing misconceptions about the body, and so we witness in modern ophthalmology an inevitable tendency to satisfy popular cravings for the appeal to the magical. The whole subject is the more insidious in relation to ophthalmology from the fact that this specialty has earned a reputation for realism that is apt to blind us to its present-day subservience to the mystical and miraculous.

Within the last year or two a sensational column appeared in the popular daily press describing how a leading eye hospital had worked "magic" in the operating theatre (I quote from memory, but I recall that this was conspicuously emphasized) by fitting to the eyes contact glasses which restored or gave sight to the amazed patient. In the sphere of private practice there is the prevailing misconception that glasses preserve sight (instead of affording merely comfort or convenience); that errors of refraction must be estimated to something like the fourth decimal point, and that (so delicate and abstruse a matter is such prescribing) this calls for mathematical knowledge of a high order.

I am not belittling precision but deploring its misapplication. It can of course be argued that any such criticism is iconoclastic, and that it is undesirable to disturb the proverbial source of the golden egg. However that may be, a professional policy which overstresses the miraculous is more likely to be doomed to sterility of creativeness in any civilization that ultimately survives the stresses of these times. In an age characterized by "somatophilia" and "somatophobia," in which people fear, not Death, but Life as they have found it under modern competition, for the time being it may suffice for individual practitioners to do their humble best to exorcize the despondency on which their practice has come to depend. But the ultimate value of a healthy specialty must depend upon its aiming at the social elimination of such fears as part rather of its collective policy than of its individual professionalism.—I am, etc.,

Bournemouth, Dec. 4. BASIL GRAVES.

SIR,—Mr. Herbert Caiger rightly says in his letter (November 30, p. 762) that "casting out fear is one of the most important services our profession can render to suffering humanity," and gives his experiences of relieving the hidden fears of his patients suffering from diseases of the eye. Socrates made this observation more than 2,000 years ago when he said, "Let no one persuade you to cure the head until he has given his soul to be cured, for this is the greater error—that physicians separate the soul from the body." It would be interesting to hear from those in charge of the insane in mental hospitals whether this principle of casting out fear is ever applied to those insane patients whose minds are distracted by horrible delusions or grave anxieties. The following case illustrates how successful this line of treatment may sometimes be in practice.

A woman aged 73 arrived in town after being away for five months, during which time she developed mental symptoms which included the delusion that someone had put alligators into her stomach that were slowly devouring her. This delusion had grown into a highly coloured picture, with the result that the patient presented an appearance of extreme depression and anxiety and looked haggard from lack of food and sleep. It was agreed in consultation that she was suffering from a certifiable paranoid condition associated with senile decay, and barbiturates were prescribed as a temporary measure, as her relatives did not want her to be removed to a mental hospital. The barbiturates proved of no help, and as a last resort it was decided to try and "cast out her fears" by what would appear to her to be a common-sense talk. It was pointed out to the patient that it was appreciated that alligators were present in her stomach, but that they were dying; that she was wrong in thinking she could starve them out by not eating, because they would then feed directly on her, and therefore she must eat as much as she could to regain her strength to fight them; that the alligators could not possibly breed inside her; and that it was quite impossible for anyone to put any more of them into her stomach because there just weren't any to be found in town! All this may sound quite fantastic, but the fact remains that her long-standing delusion disappeared in a week after daily talks of this nature, and her mental relief after them was plainly visible. Relapses with different delusions occurred during the next few months, but these responded

equally well to similar treatment. Eventually the patient became quite manageable at home on a small dose of medinal at night. There is an interesting sequel to this story. The patient was evacuated from town at the beginning of the war, and a letter was received later from her new doctor asking for the prescription of the hypnotic that had been used so successfully in her early treatment, as medinal and other barbiturates had been used with little success. It was stated in reply that the secret of the success of any hypnotic in her case was the suggestive treatment that preceded it.—I am, etc.,

London, W.11, Nov. 30. H. STEPHEN PASMORE.

SIR,—Mr. Herbert Caiger's letter (November 30, p. 762) affords an opportunity to assure him that fear in eye patients has not been overlooked. In his lectures to students at Moorfields forty years ago that genial mentor Holmes Spicer used to say: "Never forget that your patient may be fearing blindness, though he may not admit it without your help. He fears ridicule almost as much as he fears blindness." His words bore fruit, but that was forty years ago; oughtn't we to have gone further in 1940? Presbyopia—to take that as an example—is as old as the hills, and is universal; only myopes escape its inconveniences. How is it that only a comparatively small proportion of presbyopes have any conscious fear of blindness? Whence comes the fear, and where does it go after a few kind words of explanation? Why doesn't it always go? Is it a single symptom or part of a syndrome? Has it any relationship to that bugbear of childhood, fear of the dark? Is it possible that the roles may be reversed and fear become the cause instead of the effect of some morbid conditions of the eye? In short, isn't it time ophthalmologists studied psychology seriously? Can it be that it is because they are not much better equipped than the prescribing opticians to deal with this branch of medicine that the National Ophthalmic Treatment Board says so little about it in its propaganda?—I am, etc.,

Portsmouth, Dec. 6. W. S. INMAN.

Effort Syndrome

SIR,—Before Major John D. Spillane's drastic conclusions on effort syndrome (November 30, p. 739) obtain general acceptance may a patient be allowed to say something? I am sorry to mention so many personal details, but they are necessary for forming a conclusion on what is admittedly a most important matter. In 1919, when P.M.O. Jaffa, I suffered from a rather crippling attack of D.A.H., but as I was then doing public health work and did not take the *Journal* I did not recognize it as such until some years later, when the late Dr. Strickland Goodall diagnosed it for me. He told me that my heart was all right and sent me to Dr. Manson-Bahr for him to cure my amoebic dysentery, which he kindly did. This had no effect on the D.A.H., nor did a later attack of haematuria following a streptococcal throat, which kept me in bed for three months. This, however, gave me an opportunity of reading some endocrinology, and I found that a course of parathyroid might cure my tremor, which it did, but left my other symptoms untouched. In view of the remarks of Drs. E. Guttmann and Maxwell Jones (November 30, p. 736) on hyperventilation, tetany, and the effort syndrome, this seems rather interesting. In 1930 I had an attack of diphtheria and had my tonsils out, but this did not influence my D.A.H., nor did a nasty attack of septicaemia in 1933, which I contracted from a patient who died of it two days later. Finally, in 1935 my last remaining lower incisors were removed, as my lower denture was uncomfortable, and after the gas I woke up to a new world, a great weight seemed lifted off me, and for six weeks I had not the slightest signs of D.A.H. Since then I do get occasional attacks of left mammary pain (which I personally think is a true heart pain, though I know nothing of its method of causation), and this pain only comes on when I have been seriously overworking and possibly starting a mild infection. It acts indeed like a physiological conscience which must be obeyed, and when obeyed settles down at once.

This brings me to your leading article on the subject (p. 749), for I happen to be one of those "abnormal" people who "are abstainers or non-smokers with a low incidence of exposure to venereal disease." As regards these "abnormal" habits, I think everyone must agree that smoking is not natural, and certainly total abstinence and continence in the Army require some degree of self-discipline. These are surely points which ought to make for a saner and a better world; for alcohol spoils the exercise of the highest mental functions, and sexual promiscuity ruins the fine flower of family life. What is abnormal in these cases is not so much the man as the war conditions in which he is placed, and such men are likely to feel more acutely than others the appalling waste of life, effort, and property involved. Therefore, if effort syndrome is a neurosis it is totally different from a true neurosis, which is an abnormal reaction to normal circumstances, whereas this is a reaction of a sane person to a more or less mad world. As a matter of fact I do not think that mental considerations had anything to do with my case at all. My D.A.H. occurred at perhaps the happiest and most fruitful time of my career. At the urgent request of my chief, Colonel Heron, I had just finished organizing in less than a month an anti-malarial system for the whole of rural Palestine, an organization which proved so suited to local circumstances that, according to the *Times*, it was the only Government Department to function throughout Palestine during the troubles of a few years ago. I had an excellent and most devoted band of workers under me and thoroughly enjoyed my work. Yet this severe attack of D.A.H. occurred.

Thus I had four severe infections, any of which might legitimately have been considered a cause of my trouble, but actually they had no effect on it whatsoever, and the real cause seems to have been an insignificant tooth which radiologically appeared quite sound. I believe my work in Palestine will support the claim that my "abnormal habits" did in fact accompany a sane outlook on life, and I think we need some serious thinking as to what we should consider normal in human life and what we should not, before all these cases are dubbed "psychoneurotics" in which "diagnosis by exclusion . . . is no longer necessary," as Major Spillane so definitely states (p. 741). We should also realize our liability to mistakes or oversights in diagnosis. In this case it is the specialist more than anyone else who is likely to go astray, particularly if he relies on some of the modern mechanical methods of diagnosis rather than on the old-fashioned careful clinical history and thorough examination of the whole patient, and not simply of the patient as a whole. I think the statistics you give agree with what might be expected if what I have written above is true.—I am, etc.,

Winsford, Dec. 3. W. N. LEAK.

Adrenaline in Asthma

SIR,—It is a pity in some ways that we cannot drop the term "asthma" and speak of "bronchospasm" instead, for there are many causes of bronchospasm, both direct and indirect. Most of the stimuli which produce a response in the adrenals are of a psychical nature—for example, fear or rage. I do not think Dr. A. W. Dockar's suggestion of "pre-conscious fear" (December 7, p. 807) is likely to have prevented the action of adrenaline. Adrenaline evokes all the phenomena normally produced by stimulation of the sympathetic system, including among others stimulation of the adrenals and active dilatation of the bronchi.

The asthma syndrome comprises a succession of stimuli, each reinforcing those which have preceded it, and all specifically directed at the suprarenal: the emotional disturbance of an impending attack; the onset of bronchospasm resulting in a rising curve of anoxaemia (perhaps the most powerful of all); and, finally, the invocation of the accessory muscles of respiration (muscular work). There may be an adequate adrenal response at any successive stage of the paroxysm, followed by relaxation of spasm. Relaxation may only follow a continued summation of these stimuli.

It is always advisable to verify the activity of the adrenaline used. That which is old or going "pink" should be avoided. Personally I would never consciously use synthetic adrenaline. It has been my experience that cases in which there is some cause of direct irritation of the bronchi—for example, bronchitis—usually require a rather larger dose of adrenaline to effect a response than do those with marked hypoglycaemia.—I am, etc.,

Brookwood, Surrey, Dec. 8. H. M. STANLEY TURNER.

Haemolytic Streptococci in Acute Rheumatism

SIR,—The extremely interesting observations of Drs. Scott Thomson and James Innes on streptococci in cardiac lesions of acute rheumatism (November 30, p. 733) recall to me the happy memories of the time I was permitted to help and watch one of the most tragic workers on rheumatism in Vienna, Ernst Loewenstein, at that time professor of experimental pathology at the Vienna University, now a refugee, I believe, in America. As is known to the medical profession, Loewenstein claimed to be able to culture from the blood of not only tuberculous cases but also from cases of rheumatic disorders, virulent tubercle bacilli; thus declaring that endocarditis, acute rheumatism, and even chorea are due to a tubercle bacillaemia and the presence of tuberculosis in the body—possible in spite of a negative tuberculin reaction.

I had the opportunity to observe his work in Vienna for several years, and already as an enthusiastic young medical student I spent many hours in his laboratories noticing the sincerity of his conviction and efforts. He used to receive weekly many hundred samples of blood from cases of the most various kind from all parts of Europe under a scheme of the League of Nations. He never knew the clinical diagnosis of the cases beforehand, and was delighted like a child when blood culture, positive also in animal experiment, was from a case of rheumatic disease. On one occasion he said to me: "Some of my opponents suspect that the positive findings are due to a chance infection or a mixed infection of a case of rheumatic disease with tuberculosis. But tell me, how is it then possible that I never get a positive culture for tubercle bacilli if the case is not either a clinical rheumatism or tuberculosis?"

When Hamburger, the head of the Vienna paediatricians, ridiculed his theories at a meeting he called out: "Name me any chronic or acute serous inflammation which is not either tuberculous or rheumatic in origin." No one was able to answer at the time, but at the same meeting he had the satisfaction of hearing that the Vienna Pathological Anatomy Institute, in a very critical investigation of his claims under Coronini, had found tubercle bacilli in a heart muscle of a case of chronic endocarditis with no other evidence of tuberculosis.

Whatever may be the outcome of his researches, I believe they should not be forgotten but continued. "Rheumatism is an allergic reaction," I once heard Eppinger declare; "an allergy to bacillary protein"—in most cases probably the streptococcus, but in some cases at least this protein may be the tubercle bacillus.—I am, etc.,

Dundee, Dec. 9. K. A. GRAF.

Sunlight Treatment

SIR,—There is much public support given to the suggestion that the sun's rays can be safely and readily brought to the home when suitable sun lamps are installed. This is most inaccurate, for no simple lamp has as yet been designed which emits rays of light containing similar intensity and wavelength to the sun, or sunshine. Such lamps are costly, and are only suitable for institutions with expert supervision by trained medical experts and personnel.

The most popular lamp sold for home use is the mercury arc lamp and its many modifications. It can be easily operated and is simple to maintain. Similar lamps have been advocated for use in factories and industry. Unfortunately the therapeutic value of the rays of the mercury spectrum is derived from the ultra-violet rays of short wavelengths—from 2,970 Ä.U. to 2,500 Ä.U. These rays are completely absent in sunlight as received at the sea level. When treatment is given with the short ultra-violet rays a surface area of skin roughly 12 by 12 inches should be exposed and the minimal erythema dose applied. These need supervision.

The value of light as a therapeutic agent was stimulated by the discovery of vitamin D. Vitamin D is formed by a rapid photochemical reaction similar to the exposure of the sensitized photographic film. An exposure of thirty seconds at a distance of three feet to a quartz mercury arc lamp of 500 watts energy is adequate to transform ergosterol present in the skin to vitamin D. Such irradiation given once a week will protect against and heal rickets. This, however, is only one of the many biological reactions caused by the ultra-violet wave-lengths emitted by sources of light. Reyn, Strandberg, Lomholdt, Sonne, and others working at the Finsen Institute at Copenhagen during the past twenty years have shown that daily exposure—or exposure every alternate day—to two arc lamps, each operated by 75 amp. plus 50 volts D.C. (that is, 7,000 watt energy), for two to two and a half hours is necessary to heal tuberculous disease of the skin, glands, bones, and larynx. All admit these results are excellent and successful. This is striking variation in dosage! The blood platelets are increased, haemoglobin and red cells improved, and lymphocytes activated when erythema doses of ultra-violet rays are applied to a specific area of skin equivalent to one-tenth of the surface area of the body. Similarly, the bactericidal power of the blood can be augmented and reticulo-endothelial cells stimulated when a minimal erythema dose of ultra-violet rays is applied to an area of normal skin roughly 12 by 12 inches in size. These immunity reactions are associated with the production of erythema. Further, if wide areas of skin are exposed to similar energy of light rays—that is, the whole surface of the body—there are signs of overdosage and the blood picture is adversely affected. The scientific evidence obtained from laboratory and clinical research shows that rays of light will increase resistance to infection and immunity reactions of the body only when suitable dosage of rays of adequate energy have been applied to a specific surface area.

The popular method of exposing the whole body to weak doses of the rays emitted by a mercury vapour arc lamp—avoiding visible skin reaction—has not as yet given any scientific evidence which can support the claims that resistance and immunity are increased. It is admitted that there is a large volume of reported favourable results, based on entirely clinical evidence; but such records would not stand critical statistical survey. Exposure of the whole body to carbon arc lamps for fifteen minutes to two and a half hours is more comparable to the beneficial action of the solar radiation. A high energy of radiations has been absorbed by the skin. Here also the dangers of overdosage must always be anticipated and controlled.

Public effort to popularize sunlight treatment and other sources of light by the use of the mercury vapour arc lamp in a safe or foolproof manner has done much to damage the true therapeutic value of light. Such methods are to be condemned. The quartz mercury vapour arc lamp is a valuable source of ultra-violet rays, but needs to be controlled by trained personnel, for beneficial results will only be obtained when dosage is accurately controlled by a technique similar to that which I have described as "short-wave therapy."—I am, etc.,

London, W.1, Nov. 27. ALBERT EIDINOW.

Treatment of Burns

SIR,—In view of the recent reports appearing in your *Journal* on the use of tannic acid in the treatment of burns, and the opinion expressed that tannic acid should not be used on the hand or fingers, the following case might be of interest.

A few years ago, while I was in general practice, I was asked to see a child of 2 with a second-degree burn involving the whole of the front of the hand and fingers. The burn was twenty-four hours old before I was called in, and the hand and fingers were a mass of blisters. I removed all the blisters, covered the whole area with tannic acid jelly, and then covered this with a layer of boric lint. The lint adhered firmly, and apart from taking off the bandage from time to time to make sure there was no sepsis, I made no attempt to interfere with the dressing. In due course it crusted off, and the result was a perfect healing without a hint of scarring or contracture.

With this case in mind, I was pleased to see Mr. Sol. M. Cohen's article (November 30, p. 754), in which he criticizes the doubts now expressed about the use of tannic acid on the hand, and suggests that it is the burn itself which may cause the contractures, and not the tannic acid treatment of it.—I am, etc.,

Digby, Exeter, Dec. 2. DAVID GILMOUR.

General Analgesia

SIR,—Anyone can satisfy himself that there is a definite blunting of the pain sensation in Guedel's first stage of anaesthesia with nitrous oxide and air or nitrous oxide and oxygen (see letter by J. McAuley, December 7, p. 809). In the presence of another medical man nitrous oxide and oxygen in about equal proportions can be self-administered through a nasal mask. After about a minute it will be found that no pain is felt from a pin-prick. There is a slight impairment of the powers of thought, and articulation requires a slight conscious effort and has a tendency to be guttural. There is a feeling of exhilaration. Clinically one finds that the analgesia is only partial. It is in most cases essential for successful use in practice either that the patient will co-operate sensibly with the anaesthetist or that the patient has been given some such premedication as omnopon 1/3 grain and scopolamine 1/150 grain.

I have used this analgesia for such purposes as quieting children for removal of a plaster from a compound fracture, rendering tolerable an inefficient local anaesthetic for cystoscopy, drilling of a tooth cavity, relieving restlessness during spinal anaesthesia, relieving mental anxiety during operations under local anaesthesia. This amount of analgesia can be easily achieved by flowing nitrous oxide direct from a cylinder on to or over the patient's face, but the best results are obtained by using an intermittent-flow nitrous oxide and oxygen apparatus.

Patients in this condition talk sensibly and react to slight pain by screwing up their face without moving or protesting. They react to severe pain much as an unanaesthetized person would. Descent into the stage of delirium is indicated by rambling replies to conversation, marked guttural type of phonation, and squinting or abnormal movements of the eyes. —I am, etc.,

Colchester, Dec. 7. D. R. T. CLENDON.

Hydrogen-ion Concentration in Rheumatic Fever

SIR,—In connexion with the suggestion of Drs. Scott Thomson and James Innes (November 30, p. 733) that haemolytic streptococci may cause heart lesions, it may be interesting to note that in all cases of rheumatic fever the *p*H is increased. Does this increase precede or follow the introduction of the streptococci?—I am, etc.,

Dec. 3. G. ARBOUR STEPHENS.

Detoxication of Lead by Apples

SIR,—In connexion with the leading article on the above subject (December 14, p. 835) it is interesting to note that cider was definitely proved to have been the cause of the "Devonshire colic" which was endemic in that county during the first half of the eighteenth century. Sir George Baker proved that the symptoms were due to the large amount of lead which was used in the construction of the cider vats and presses. His paper was read before the Royal College of Physicians in 1767.—I am, etc.,

Totnes, Devon, Dec. 14. F. W. MORTON PALMER.

Diet and Health

SIR,—Nowadays much is heard about the functions of the various vitamins, and stress is being laid on the importance of what are called "protective" foods. There is, however, a tendency to overlook the well-known fact that certain human communities, both past and present, have enjoyed excellent health though living under defective hygienic conditions, and this has been attained on various restricted diets which conform but little to the standard now insisted upon by dietary authorities.

Steps may be taken to supplement our staple foods with vitamins, with or without certain other essentials, but if there still persists any deficiency of a necessary vital element then genuine good health is unattainable. That such a deficiency in our ordinary foods does exist is clearly demonstrated by the marked prevalence of goitrous manifestations in the community at large, the basic cause of which is an absolute of relative iodine defect which can be very simply remedied, the necessary quantity being excessively minute. This fact is now becoming recognized in certain Continental quarters, where they are beginning to realize that the value of an iodine supplement is not restricted merely to the elimination of goitre, which is just a significant visible signal.

Correct feeding is the key to preventive medicine, as it will tend to eliminate endocrine disorders, to normalize resistance to infections, and to control those processes responsible for constitutional affections in general. We are accustomed to study diseases separately, but a new era in medicine will dawn when we begin to look upon health as a whole and disease as a whole, which was the great conception of Hippocrates.—I am, etc.,

Cardiff, Dec. 9. W. MITCHELL STEVENS.

Economy in Drugs for Skin Diseases

SIR,—Could not much more be effected by a general economy in use than by restriction of specific products the absence of some of which will cause some difficulty, if not lead to yet further waste on account of unsuitability.

At the beginning of this war I had my dispenser make me cylinders of sealing wax of various sizes representing the volumes of an ounce, half an ounce, down to half a drachm of ointment. With these before me on my desk I find I am now prescribing a couple of drachms where in the old days I should automatically have ordered an ounce. Recently I was unlucky enough to develop interdigital ringworm of both feet. One drachm of ointment sufficed to treat the lesion twice a day for three weeks. I also found that 5 grains of Whitfield's ointment would easily cover both hands. An ounce, therefore, should last three months; the average hospital patient will nevertheless get through this quantity in a week. The employment of a nurse trained to instruct patients in the use of local remedies would probably earn her keep for the hospital, quite apart from the saving of national resources and improved therapeutic results.—I am, etc.,

Hove, Dec. 7. J. H. TWISTON DAVIES.

The Services

HONORARY PHYSICIAN TO THE KING

Surgeon Rear-Admiral C. V. Griffiths, D.S.O., R.N., has been appointed an Honorary Physician to the King in the place of Surgeon Rear-Admiral T. Creaser, R.N., who has retired.

CASUALTIES IN THE MEDICAL SERVICES

ROYAL NAVY

Temporary Surgeon Lieut. WILLIAM WADSWORTH WILDMAN, R.N.V.R., was killed in H.M.S. *Berwick* during the action referred to in an Admiralty *communiqué* issued on November 28. He was educated at the University of Edinburgh and the University of Paris and graduated M.B., Ch.B. in 1931. Four years later he took the D.P.H. of the University of London. He had held the posts of resident medical officer and house-surgeon at the French Hospital in London; resident medical officer at the Weir Hospital, Balham, and at the City of Leicester Isolation Hospital and Sanatorium; and assistant medical officer of health and school medical officer of the West Bromwich County Borough. At the outbreak of war he was assistant county medical officer of the Norfolk County Council and medical officer of health of the Downham Market Urban and Rural Districts and the Marshland Rural District. He joined the British Medical Association in 1932 and was a Fellow of the Society of Medical Officers of Health. He contributed an article on the aetiology of impetigo contagiosa in children to the *Medical Officer* in 1937.

ROYAL ARMY MEDICAL CORPS

Wounded

Major Robert Elliot Davie, M.C.

Prisoners of War

Lieut.-Colonel William Edmund Alexander Buchanan, T.D.
Temporary Major Angus Harold Weston.
Acting Major John Dow Finlayson.
Acting Major Hubert Reinerus Fosbery.
Captain John Patrick Fox.
Lieut. Gordon Milne Anderson.
Lieut. John Walker Sinclair Irwin.
Lieut. Peter Ewart Romney Tattersall.

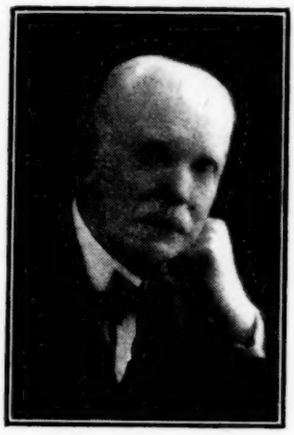
Obituary

ROBERT HOWDEN, LL.D., D.Sc., M.B.

Emeritus Professor of Anatomy, University of Durham

We regret to announce the death at the age of 84 of Prof. Robert Howden.

Robert Howden, who was born in 1856, was educated at Edinburgh University, where he qualified M.B., C.M. in 1884. After qualifying he was house-physician at the Edinburgh Royal Infirmary and Demonstrator of Anatomy in the University. He was honorary local secretary at the Newcastle Annual Meeting of the B.M.A. in 1893, and secretary of the Section of Anatomy and Physiology; he was vice-president of the Section of Anatomy at the Oxford Meeting in 1904. Prof. Howden examined in his subject for several universities, and from 1901 to 1926 edited *Gray's Anatomy*. He was president of the Anatomical Society of Great Britain and Ireland 1914–16. We are indebted to Prof. Grey Turner for the following appreciation.



The announcement of the death of Emeritus Professor Robert Howden, at the ripe age of 84, will arouse many vivid recollections connected with the Medical College in Newcastle-upon-Tyne. When I first joined as a student, about forty-seven years ago, "Bobbie" was the most popular, and certainly the most influential, of our teachers, for he made the subject of anatomy of living and surpassing interest, and his department was splendidly managed. In retrospect he will always be remembered as an excellent teacher of plain straightforward anatomy. He would never allow us to divert our minds on the abnormalities or mere trivialities of the human body, but he did endeavour to give his students a thorough grounding in the subject which he had made so much his own. He was not only a first-rate lecturer and demonstrator, but a strict disciplinarian, a very necessary attribute in those days. Howden was also an excellent draughtsman, and to this day it seems to me a sacrilege that his beautiful blackboard pictures had ever to be erased. As one of the brilliant band of demonstrators trained under the great Sir William Turner he was full of anecdotes about his master, and these he used to retail to us on Friday afternoons, which were "show-up" days, when he inspected our dissections and allotted the appropriate marks. On those not-very-formal occasions he was perfectly delightful, and his stories, not only about Sir William but of Knox, the Goodsirs, Struthers, Allen Thomson, and many others under whom he had studied were entertaining and stimulating. On far too rare occasions he referred in his talks to the application of anatomy to surgery, and it was partly due to these references that my enthusiasm for the surgical art was fostered.

Howden was not only our teacher in anatomy, but a sort of father to the students in general. He was the one man to whom we used to look for advice and general help, and it seemed not unnatural that he should later become the administrative head of the College of Medicine. I always regret that the additional work that this entailed should have been thrust upon him, for he was so excellent in his own department that, in spite of first-rate assistants, it suffered from his preoccupation in other directions. He had wonderful hands and made most beautiful dissections, and I always believe that had he devoted himself to the work of a surgeon he would have shone perhaps as much as some of his brilliant fellow-students of the Edinburgh day to which he belonged. For many years he was editor of *Gray's Anatomy*, and he put an immense amount of work into the accomplishment of that task. Innumerable dissections were made for the purpose of new illustrations, and he constantly strove to keep the book up to date. I think it was his affection for the book that made him agree so readily to my suggestion that he should put in a photograph and a biographical note of Henry Gray, the originator of that time-honoured work.

When Prof. Howden gave up his work in Newcastle thirteen years ago, after thirty-eight years of devoted service to the College, he appeared to be wonderfully vigorous and in excellent health, except for a little defect in hearing. But the early years of his retirement were marked by a series of surgical illnesses which would certainly have broken the courage of many men who were not so stoical. Though his manner was perhaps a little forbidding he was very kind in a brusque sort of way, and far more students than will ever know it are indebted to him for the way in which he pushed them on, in spite of their shortcomings. He enjoyed the happy association of a most devoted wife, with whom much sympathy will be felt in her bereavement.

[The photograph reproduced is by Elliott and Fry, Ltd.]

FREDERICK CHARLES LARKIN, F.R.C.S.

The death on November 25 of Mr. Frederick Charles Larkin will be regretted by many, especially old students of the Liverpool Medical School and of the Stanley Hospital.

Mr. Larkin, who received his medical education at Liverpool University, qualified M.R.C.S. in 1885 and took his F.R.C.S. in 1889. Soon after qualifying he began work as demonstrator in physiology and, later, in pathology in the Liverpool school. He quickly acquired a reputation as a teacher—a reputation which was enhanced after his appointment in 1889 to the surgical staff of the Liverpool Stanley Hospital, where he soon made a name as a clinician and operator. He was one of the pioneers of thyroid surgery in Liverpool. The secret of his success as diagnostician, operator, and teacher lay in the clarity and logical texture of his thought and the close and constant relationship he maintained between his practical surgical work and the principles of physiology and pathology. He took a keen interest in medico-political questions. For fifty-five years he was a member of the British Medical Association, and the offices he held included honorary secretary of the Lancashire and Cheshire Branch, 1908–17; representative on the Representative Body for a number of years between 1908 and 1915; and member of Council of the Association in 1907–8 and again in 1915–16. When the Association met at Liverpool in 1912 he was vice-president of the Section of Surgery. During all these years he did not spare himself in his efforts to promote medico-political amity; he entered with zest into the discussions on the National Health Insurance Bill, and played no small part in crystallizing medical opinion on this subject in Lancashire and Cheshire. But it is perhaps for his share in the work of the Organization Committee of the B.M.A. between 1907 and 1915, especially as its chairman from 1910 to 1915, that he will be remembered at headquarters. Next to surgery and medical politics, Larkin's interests lay in historical research and in ecclesiastical architecture. He was an authority on the history of Liverpool and Lancashire, and he was a Fellow of the Society of Antiquaries and, at the time of his death, vice-president of the Historic Society of Lancashire and Cheshire. He leaves a widow, who nursed him with singular devotion during his years of failing health.

Dr. A. C. WILSON of Formby writes:

The passing of F. C. Larkin at the ripe age of 82 brings memories of 1885, when he was demonstrator in physiology and I was a first-year student. With a quiet manner, without any airs, Larkin had a gift for teaching, combined with a singularly clear brain and retentive memory. He had the

art of reducing the seemingly complex to simplicity. As a consequence he was in great demand as a coach. Larkin had the scientific mind which brought things down to essentials. As a man he was popular and friendly with students, though he had no particular reverence for those in authority unless he thought it justified by merit. In his day he was a diagnostician and operator equal to any in Liverpool, though he himself would have excepted J. T. Paul.

Prof. J. A. TWEMLOW (formerly Professor of Palaeography, University of Liverpool) writes:

It was at the meetings of the Historic Society of Lancashire and Cheshire that I first got to know Larkin, and, from 1920 onwards, to learn from him. Had he lived another month he would have been a member of the "Historic" for forty years, during the greater part of which he was, as one of its vice-presidents, the genial chairman at many of its meetings. The scope of the Historic Society includes the archaeology and antiquities, and the history, mediaeval and modern, of the two neighbouring counties, and of Liverpool in particular. In all these fields of the Society's activities Larkin played a leading part. His knowledge of archaeology was very wide. He had visited and could describe every important prehistoric site in the country, and when he retired from practice he was able to take an active interest in excavation. His knowledge of mediaeval antiquities, especially ecclesiastical, was no less extensive. He seems to have seen and photographed, inside and out, every mediaeval church in the kingdom. His interest in the history of the city of his adoption was equally keen. He was, in fact, the chief authority on the topography of old Liverpool. Of this topographical knowledge he generously gave me the benefit when the second volume of my *Liverpool Town Books*, published in 1935, was going through the press. One of the most modest of men, although he may not always have seemed so, Larkin was not one of those who "suffer fools gladly." A competent Latinist and a good French scholar, he was always ready to learn some new thing. In his later years he even taught himself palaeography, at least to the point of being able to decipher a mediaeval charter. No man less sought the limelight, but when a few years ago he found himself decorated with the blue ribbon of the "Order of Archaeology," by being elected a Fellow of the Society of Antiquaries of London, he was mildly, but I think genuinely, gratified.

C. W. SALEEBY, M.D., F.R.S.ED.

We regret to announce the death at the age of 62 of Dr. C. W. Saleeby, the well-known medical publicist.

Caleb Williams Saleeby was educated at the Royal High School and University, Edinburgh, where he qualified M.B., Ch.B. in 1901, with first place in first-class honours; he proceeded to the M.D. in 1904. He was also Ettles scholar and Scott scholar in obstetrics. He served for a time as junior demonstrator of anatomy and was later resident physician at the Maternity Hospital and in the Royal Infirmary at Edinburgh. Subsequently he assisted Sir Jonathan Hutchinson at the Polyclinic, London. Dr. Saleeby will be best remembered for his efforts to popularize the science of eugenics, in which he became interested by his early association with Sir Francis Galton, through whom he was elected to the council of the Sociological Society more than thirty years ago. Another cause near his heart was the effect of sunlight on health. He was an enthusiastic advocate of smoke abatement and of the better use of sunlight, and rational clothing and exercise. Recent correspondence in these columns reminded readers of the active part played by Dr. Saleeby in the last war in securing the adoption of the steel helmet, the use of which has been of incalculable benefit to soldiers in the field and now to those who take a dangerous part in the civilian defence services. It was inevitable that a man of his nature should be asked to help those causes concerned with better living in all its numerous aspects. He was, for example, chairman of the Executive Committee, World League against Alcoholism; vice-president of the Divorce Law Reform Union; and member of the National Birthrate Commission; he also served on the councils of the Sociological Society, the National Association for Welfare of Infancy, and the People's League of Health. He was life governor of the Royal Free Hospital. Between 1907 and 1923 Dr. Saleeby gave lectures at the Royal Institution on eugenics, and in 1915 was Chadwick lecturer. His energy and enthusiasm took him on lecture tours on public health and prohibition in Canada, the U.S.A., and many European countries. Among his earlier publications were the *Cycle of Life* (1904); *Evolution: The Master Key* (1905); *Parenthood and Race Culture: An Outline of Eugenics* (1909); in 1918 he published his Lees and Raper Lecture—*A Ministry of Health and the Racial Poisons*. Dr. Saleeby had the satisfaction denied to many crusaders that most of his crusades had succeeded.

His first wife was Monica Mary Meynell, daughter of Wilfred Meynell and Alice Meynell. Eleven years ago he married as his second wife Muriel Gordon, the elder daughter of the late Rev. R. B. Billinge.

J. B. MAGENNIS, M.B., B.Ch.

We regret to record the death at the age of 49 of Dr. J. B. Magennis, visiting physician to St. Vincent's Hospital, Dublin. Dr. Magennis took his B.A. in 1911, B.Sc. in 1913, and qualified M.B., B.Ch., B.A.O. in 1914 from University College, Dublin. He had a brilliant scholastic career, gaining the Entrance Exhibition to the Royal University of Ireland in 1908, Postgraduate Scholarship in 1913, and scholarships in literature and medicine in 1909 and 1914 respectively. Among his various appointments he was demonstrator in anatomy at University College, Dublin, and examiner in biology, modern languages, and medicine at Apothecaries Hall, Dublin. After qualifying he was house-physician and house-surgeon to St. Vincent's Hospital, Dublin, and for some years had been visiting physician to the same hospital. He was a Fellow of the Royal Academy of Medicine in Ireland. In the last war he served as a surgeon with the rank of major with the French army at Verdun, and for his services was made Chevalier de la Légion d'Honneur. Dr. John Mowbray writes:

J. B. Magennis was born in Lurgan, Co. Armagh, forty-nine years ago. His early education took place, however, in Dublin, his father sacrificing the fruits of a well-established practice to begin anew in the capital, so that his children might have the chance they deserved. Jim Magennis won a never-ending succession of medals and exhibitions, he captained the first team for many years to bring home the shield in gymnastics, and as an interpreter of Shakespeare on the amateur stage he began a hero-worship of famous artists which was to ripen with the years into lasting friendships. At the early age of 16 he went to Cologne University to study his first loves, art and literature, but, doubtless finding that they alone could not give him the opportunities for service without which he felt he could not fulfil himself, he returned to University College, Dublin, to become a doctor. A man such as this could not fail to attract the attention of his teachers, and Michael Cox, the senior physician of St. Vincent's Hospital, and John S. McArdle, the senior surgeon, saw in him a worthy successor, one in the genuine tradition of the school they had made famous. A bright and assured future lay before him, but first there was the great demanding present of 1914–18 to be satisfied. He served as médecin-major with the Second French Army at Ravigny, for which he was later decorated Chevalier de la Légion d'Honneur. On his return he began in real earnest a most successful medical career. He was gifted with a personal magnetism, an innate kindliness, and an unerring intuition, and these, combined with an electric energy and a complete selflessness, made him the idol of countless patients. But it was the poor who knew that success could not mar the greatness and the

goodness of their Doctor Jim. In all his wards—for he was now visiting physician—he was loved and blessed, but in none more than in his tuberculosis annexe.

He loved the thrill of the turf, and all Ireland cheered with him when Galli-Galli carried his blue colours to victory in the Irish Cesarewitch. But his work was his real relaxation. Unfortunately for himself, and now for us whom he leaves bereft, he set his standard too high for human endurance, nor would he lower it in face of increasing disability.

We regret to announce the recent death, at the age of 51, of Dr. F. W. EDWARDS, F.R.S., deputy keeper of the Department of Entomology in the British Museum. Dr. Edwards graduated at Cambridge in 1909 and took the degrees of M.A. in 1925 and Sc.D. in 1931; he was elected F.R.S. in 1938. He joined the staff of the Department of Zoology in the British Museum in 1910, being appointed assistant in the entomological section. When he became deputy keeper of the Department of Entomology the project was to carry on and extend the work of F. B. Theobald, the last volume of whose *Catalogue of Mosquitos* had appeared only a few months earlier. Within two years Edwards had published ten valuable contributions on the systematics of the Culicidae of Africa, the Oriental region, and Great Britain. A series of papers on the African fauna in the *Bulletin of Entomological Research* was of much service to both entomologists and medical men in that continent; the whole subject was brought up to date in the last volume of *The African Mosquitos* to be published by the trustees of the British Museum (Natural History). Dipterists the world over are profoundly in Dr. Edwards's debt for the lead and help he has given them.

The *Times* of December 5 announced the death of Dr. HENRY STANLEY (formerly Reah), lost at sea by enemy action in July. He was the second son of the late Mr. J. H. Reah of Newcastle-upon-Tyne, and was educated at the University of Durham, where he graduated M.B., with first-class honours, and B.S. in 1902. He proceeded M.D. in 1920 and took the D.P.H. of the University of Aberdeen in 1918. After acting as demonstrator in physiology and pathology in the University of Durham Medical School and as house-surgeon and accident house-surgeon at the Royal Victoria Infirmary, Newcastle-upon-Tyne, he entered public health work, and was medical officer of health of the Havant Urban District Council and assistant medical officer of the Hampshire County Council. For many years he served in the R.N.V.R., in which he rose to be surgeon commander and received the Volunteer Decoration. During the war of 1914–18 he served in the Mediterranean, and was the author of a record of work in the R.N. Hospital Ship *Sudan* in the Eastern Mediterranean, published in the *Journal of the Royal Naval Medical Service* in 1915.

Medical Notes in Parliament

Amendments to rules made by the General Nursing Council for England and Wales were presented to Parliament on December 14.

A petition from London and other places for prohibition of vivisection was presented to the House of Commons on December 14.

The War Damage Bill, to provide for the compulsory insurance of immovable property against war damage and for the voluntary insurance of goods against the same risk was read a first time in the House of Commons on December 11 and its second reading was set down for the following week. The professions will come within the "business scheme," which will cover movable plant, office furniture, etc., owned by, or in the possession of, or mortgaged to, a person for the purposes of his business. The "private chattels scheme" will cover furniture and effects not falling within the first scheme. It is proposed to prescribe £1,000 as the sum up to which a person may insure under the "business scheme" for the full value of his property, at a premium of 30s. per cent. in respect of the war period up to the end of September, 1941. The same rate is proposed under the "private chattels scheme," with a limit for any one person of £1,500 and an additional sum not exceeding £500 in respect of a motor car or motor cycle. In the compulsory scheme for buildings and other immovable property charities for the treatment of sickness will pay no contribution, while charities for the advancement of education, science, or research will pay contribution at one-third of the full rate.

Physiotherapy in the Army Medical Service

On December 10 Sir FRANCIS FREMANTLE asked the Secretary of State for War what arrangements for physiotherapy had been made by the Army Medical Service, and whether advantage had been taken of the services of persons in civil life with expert experience of the subject. Mr. EDEN: There are physiotherapy departments in all the more important military hospitals and convalescent depots, to which suitable equipment is supplied in the case of all establishments requiring such equipment. In addition, such departments exist in certain of the Emergency Medical Service hospitals of the Ministry of Health which are available for the accommodation of military patients. A consultant in physical medicine to the Army and specialists in Army Commands have been appointed. Their duties are to advise and supervise the treatment of patients in military hospitals and convalescent depots, and to train Army Physical Training Corps instructors in medical measures. The consultant and specialists were selected on account of their experience in physical medicine in civil life.

Transfer of Panel Patients.—On December 10 Mr. GROVES asked the Minister of Health whether a panel patient whose doctor had been called up for service must forthwith transfer to any remaining doctor whom he might choose or only to the lists of those who had joined the Protection of Practices Scheme. Mr. MACDONALD said that where the Protection of Practices Scheme concerned was on a voluntary basis the right to transfer after giving due notice was not affected, but immediate transfer could only be made to the list of a participating practitioner. Where, however, the arrangements had been made by amendment of the Insurance Committee's allocation and distribution schemes immediate transfer could be made to the list of any practitioner willing to accept the insured person seeking transfer.

Dental Surgeons as Anaesthetists at Brighton.—On December 10 Mr. GROVES asked the Minister of Health whether he was aware that the Royal Alexandra Hospital for Sick Children, Brighton, and the Royal Sussex County Hospital, Brighton, had appointed dental surgeons as anaesthetists for casualties, although medical men were available, and whether he would investigate the matter and take steps to terminate the present appointments and appoint only anaesthetists holding medical qualifications. Mr. MACDONALD: No, Sir. I am informed that both these hospitals have arranged for a number of local dental surgeons to receive a special course of training in anaesthetics with a view to acting as anaesthetists in an emergency, if medical men were not available. Several of these persons gave valuable service as anaesthetists at the Royal Sussex County Hospital during the heavy pressure of work on Service casualties immediately following the evacuation from Dunkirk. Such arrangements are within the discretion of the hospitals concerned. As the employment of dental surgeons without medical qualifications to act as anaesthetists at both these hospitals is limited to the circumstances indicated, I am not prepared to take any action on the lines suggested in the last part of the question.

Notes in Brief

Distribution will begin within a few days of three types of leaflets of advice and instruction for persons sleeping in shelters.

Women employed in the Royal Army Medical Corps as medical officers receive pay and allowances as for single officers of the Corps except ration allowance, which is four-fifths of the current rate for officers. The outfit grant is £30.

Mr. Herbert Morrison has arranged to provide as soon as practicable coal stoves of a special type or other forms of heating in certain brick surface shelters and trenches which are used for sleeping purposes, in accordance with the recommendations of the Horder Committee. Those recommendations related to shelters used for sleeping purposes. Mr. Morrison does not consider that there is sufficient justification for heating shelters not so used.

The issue of medicines and tablets as part of the scheduled equipment of medical aid posts in large public air-raid shelters in London is well in hand. In large shelters which are well filled heating has been found by experience not to be necessary, but measures are in hand for providing the necessary amount of heating in the brick surface shelters and in trench shelters.

Universities and Colleges

UNIVERSITY OF OXFORD

B.M. Examinations

At a meeting on November 27 the Board of the Faculty of Medicine decided that there should be an extra First B.M. examination, beginning on Monday, March 17, 1941. The detailed time-table will be issued when ready.

UNIVERSITY OF CAMBRIDGE

At a Congregation on December 9 the following medical degrees were conferred:

M.D.—*A. B. Carter.

M.B., B.CH.—*L. W. Spratt, *I. S. Eve, *R. G. D. Forward.

* By proxy.

UNIVERSITY OF LONDON

At a meeting of the Emergency Committee of the Senate, held on December 11, it was announced that the title of Professor of Physics as applied to Medicine in the University had been conferred on Dr. W. V. Mayneord in respect of the post held by him at the Royal Cancer Hospital (Free).

The following candidates have been approved at the examination indicated:

POSTGRADUATE DIPLOMA IN PSYCHOLOGICAL MEDICINE.—*With special knowledge of Mental Diseases (Psychiatry):* W. E. W. Bridger, M. Radzan. *With special knowledge of Mental Deficiency:* J. de Bastarrechea.

UNIVERSITY OF MANCHESTER

The following candidates have been approved at the examinations indicated:

FINAL M.B., CH.B.—T. Brittain, I. C. Campbell, I. Dickson, H. Diggles, J. H. Gifford, L. A. Gifford, F. T. Jones, P. W. Kippax, W. Mellor, Catherine E. D. Nash, G. K. Spruell, T. A. Taylor, Edith M. Thorp, *†D. H. M. Titcombe, H. Wadsmley. *Part I:* C. P. Brown, E. A. Cachia, D. M. Coates, E. Consterdine, B. I. Eames, A. Glass, E. Greenwood, Dorothy Hey, J. H. Hilditch, M. Levinson, N. S. Marsden.

THIRD M.B., CH.B.—*Pathology and Bacteriology:* Alice Akred, G. Ashe, A. N. Ashworth, Shirley G. Barrett, Pauline Blackley, H. Bolton, H. A. Boydell, D. M. Brierley, W. E. Broughton, Kathleen M. Brown, J. G. Coburn, D. G. Crawshaw, Betty J. Dakin, D. Eglin, C. J. L. Elsdon, Nora F. M. Falk, A. I. Goodman, S. Grace, R. Greenwood, N. Harris, K. Heap, W. H. Lonsdale, R. L. Lunt, C. W. Marsden, R. W. T. Mason, Ann L. Pinson, Ethel J. Samuel, Eileen T. Sloane, H. F. Smith, ‡S. W. Stanbury, O. C. Sugden, D. Sutton, M. Swerdlow, R. H. Townshend, A. E. Wall, J. Whewell, J. K. Wright. *Pharmacology:* D. J. Atherton, J. S. Battersby, D. C. A. Bevis, D. H. Blakey, H. M. Blaquière, Alice I. Burke, ||Margaret R. Burke, W. Clegg, O. O. Cowpe, H. Davies, C. J. Dewhurst, P. R. Duncan, L. Erin, F. Fletcher, J. W. Fletcher, Margaret Garnett, J. A. D. Giles, G. Hargreaves, J. Hinchliffe, C. L. Holden, J. C. Howarth, F. Jackson, R. McK. Laslett, Marjorie T. Lee, Mary P. McGlade, R. I. Mackay, D. H. Makinson, A. Marsland, E. B. N. Merchant, Doreen Mitchell, J. G. Oddy, P. T. Quinlan, ||S. B. Rampling, F. C. Reidy, P. H. Renton, A. F. Robinson, M. M. Rose, B. Samuels, R. H. Sewell, J. Sharp, J. H. Shelswell, Sylvia, M. Slee, ||K. H. Smith, ||H. Sosnowick, J. L. Taylor, ||R. Tepper, Ruth J. Whitley, T. A. Yates.

* With second-class honours. † Distinction in surgery. ‡ Distinction in pathology. || Distinction in pharmacology.

UNIVERSITY OF EDINBURGH

At a graduation ceremonial on December 13 the following medical degrees and diplomas were conferred:

M.D.—†J. D. Allan, Captain, R.A.M.C., *G. J. Carr, Major, R.A.M.C. (*in absentia*), T. A. MacGibbon, Captain, R.A.M.C. (*in absentia*), K. D. Salzmann (*in absentia*), G. M. Thomson.

M.B., CH.B.—W. G. Batters, A. L. Bell, Margaret H. Calder, A. Campbell, W. C. Clark, J. M. Dawson, R. C. Dickson, J. Falk, Elizabeth Hainsworth, A.-H. Haseeb, J. L. Huggan, Elizabeth L. Knox, W. MacD. Latham, E. M. Leyland, G. B. Libbey, M. R. Liddell, P. J. Loots, Lucy M'Farlan, I. G. M'Gregor, J. F. M'Harg, M. M'Murrich, Alison M. Macquarrie, J. S. Main, J. May, J. T. Millar, F. E. Milson, G. H. Murray, S. M. Musgrave, L. D. Philp, D. H. Pirie, W. V. Pole, Isobel J. Robertson, P. H. Scott, J. P. Sexton, R. L. Walsh, I. M. Wood, A. Young.

DIPLOMA IN MEDICAL RADIOLOGY.—H. Din, H. Hirschson.

PH.D.—In the Faculty of Medicine: G. T. Meiklejohn (*in absentia*), W. N. M. Ramsay, A. Robertson.

* Highly commended for thesis. † Commended for thesis.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

At a meeting of the Council of the Royal College of Surgeons of England, held on December 12, with Mr. Hugh Lett, President, in the chair, Mr. Robert Milne, Mr. V. Zachary Cope, Mr. C. E. Shattock, Lieut.-Colonel M. F. Nicholls, and Mr. E. W. Riches were admitted Members of the Court of Examiners.

A resolution of thanks was passed for the gift of $7,500 from the Rockefeller Foundation for evacuating the library and research laboratories. A legacy of £1,800 from the late Sir Charles Tomes was reported.

Diplomas

Diplomas of Fellowship were granted to the following candidates:

S. F. Taylor, J. G. C. Spencer, G. De Lacey, H. C. Fletcher-Jones, H. D. Johnson, C. Langmaid, J. A. Seymour-Jones, F. S. A. Doran, Eleanor M. Mills, D. P. van Meurs, B. R. Billimoria, G. Flavell, H. C. Barry, W. G. Mills, I. M. Jackson, A. F. Williams, R. D. N. Bissett, Edith A. M. Whetnall, J. F. Bourdillon, D. A. Arnott, A. el S. A. el G. El Barbary, F. W. Connaughton, W. W. Gilford, G. J. Hanly, C. B. Innes, R. Ismail, H. Lal, C. T. Möller, L. I. Parton, W. L. Phillips, R. Prasad, L. L. Samy.

A diploma of Membership was granted to John Herbert Hicks.

Diplomas in Anaesthetics were granted, jointly with the Royal College of Physicians of London, to the following candidates:

D. Aserman, W. Auld, A. J. W. Beard, H. M. Bird, Agnes C. Clark, Flight Lieutenant, R.A.F., R. M. Davies, F. C. Deller, O. P. Dinnick, Nancie I. Faux, W. J. Finnie, H. F. Harvey, Flight Lieutenant, R.A.F., D. Hewspear, T. H. Hughes, J. U. Human, H. Kopelman, J. L. Linacre, B. E. P. McCullough, H. C. Maclaren, T. T. P. Murphy, Major, R.A.M.C., N. C. Porter, J. F. Rickards, J. D. Rochford, Lieutenant, R.A.M.C., H. J. Shorvon, Margaret N. Smith, J. H. Taylor, A. Tindal, W. J. Walter, Lieutenant, R.A.M.C., H. B. Wilson.

Diplomas in Laryngology and Otology were granted, jointly with the Royal College of Physicians of London, to the following candidates:

L. S. Corner, J. B. Dowe, G. S. Irvine, K. H. Singh.

Medical News

The name of Dr. Harry Warren, medical officer in charge of the mobile aid post, Maidstone, has been brought to notice for brave conduct in connexion with civil defence.

Scandinavia's largest hospital, the Carolinian, which stands near the city limits of Stockholm, was opened at the end of September by the King of Sweden. It has 1,200 beds, and consists of a series of buildings grouped round a large central block. Departments such as the Cancer Hospital, the Psychiatric Clinic, the Cripples Hospital, etc., are accommodated in special buildings. Large wards have been abolished in favour of smaller rooms for only a few patients; a standard ward is intended for only twenty-five patients and comprises, as a rule, two 6-bed, three 3-bed, one 2-bed, and two single-bed rooms. Personnel and staff number over thirteen hundred. A break with tradition is seen in the provision of a bar where beer is obtainable, and of smoking-rooms. The very large bomb-proof underground quarters, which were not included in the original plan, are blasted out of the rock on which the hospital stands. The institution has been built with money granted by the State and contributions from the city and district of Stockholm. The cost so far has been about £2,060,000. The Carolinian Institute, with which the hospital is associated, is Sweden's principal medical school, and has an average of 1,000 students. The new hospital will provide the institute with more centralized observation facilities as well as with new technical and scientific resources.

The intention of South Africa to operate hospital ships off the East African coast has been announced by the Governor-General, Sir Patrick Duncan.

Seven Red Cross Hospitals for the convalescence of wounded soldiers from Great Britain will be established across Canada. They will have a total bed accommodation for 925 men.

Dr. James Ewing, emeritus professor of pathology at the Cornell University Medical School and formerly director of the Memorial Hospital for the Treatment of Cancer and Allied Diseases, has been presented with the fourth Clement Cleveland Medal of the New York City Cancer Committee for "outstanding work during the year in the campaign to control cancer."

The first number of volume xii (June, 1940) of the *Index to the Literature of Food Investigation*, issued by the Department of Scientific and Industrial Research, is now available and can be obtained from H.M. Stationery Office, price 4s. 6d. net.

An Argentine Society of Medical Psychology and Psychoanalysis has recently been established.

Dr. Geoffrey Legh Wilkinson (Middle Temple) was called to the Bar on November 18.

Dr. Roscoe W. Hall, clinical professor of psychiatry at George Washington University, was elected president of the American Psychiatric Association at their last meeting.

Dr. Gordon S. Fahrni of Winnipeg, Manitoba, has been elected president of the Canadian Medical Association in succession to Dr. Duncan Graham of Toronto.

Dr. G. F. Buchan, medical officer of health for Willesden, has been admitted to the freedom of the City of London as a liveryman of the Apothecaries' Company.

A hospital with 360 beds for the merchant marine was opened at Boston last June under the Public Health Services.

Queensland has been suffering from a heat wave and the temperature was 111° F. at Windorsh and 110° at Charleville.

In 1934 the United States had only a little more than 5,000 cases of small-pox. Since then there has been a rapid increase. In 1937 there were 11,673 cases; in 1938 almost 15,000.

A severe epidemic of malaria has recently been reported in East Anatolia.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

The principal notifiable diseases, with the exception of whooping-cough and dysentery, have decreased in incidence in England and Wales during the week. For the first time for many weeks notifications of measles have fallen, but the fall is small and probably only temporary. The disease, although epidemic in several centres, notably the industrial areas of Lancashire and the West Riding of Yorks, is considerably less prevalent than at this time last year, but past experience suggests that the maximum incidence is likely in the first quarter of next year, probably in March. Whooping-cough, on the other hand, is more prevalent than it was last year, and notifications have risen each week with tolerable constancy during the last quarter; the figures for the last six weeks are 1,373, 1,499, 1,656, 1,740, 1,925, and 2,032. In London numbers have remained low, with considerable fluctuations from week to week. The counties chiefly affected are: Lancashire 387 (Blackpool 49, Bolton 30, Liverpool 28, Manchester 27, Southport 37, Warrington 36, Padiham U.D. 10, and in 44 other areas, urban and rural); Warwick 224 (Birmingham 182, Solihull U.D. 16, Coventry C.B. 8); Stafford 184 (Smethwick 32, Stoke-on-Trent 32, Wolverhampton 42, Walsall 12, Brierley Hill U.D. 11, Cannock R.D. 10); Yorks, West Riding, 138 (Bradford 28, Halifax 32, Sheffield 8, Rotherham 7, Ossett M.B. 14); Chester 92 (Chester and Stockport 6 each, Altrincham U.D. 13, Stalybridge M.B. 10, Tarvin R.D. 12); Yorks, East Riding, 68 (Kingston-upon-Hull 65, Haltemprice U.D. 2, Howden R.D. 1). No cases were recorded in the North Riding of Yorks.

The incidence of dysentery has tended to increase in the last few weeks; the disease is not widely distributed, 14 counties only being affected and 6 only have more than half a dozen cases—namely, Surrey 22 (Coulsdon and Purley U.D. 15, Frimley and Camberley U.D. 6, Carshalton U.D. 1); Denbigh 16, all in Hiraethog R.D.; Essex 12 (Brentwood U.D. 11, Colchester M.B. 1); Lancaster 9 (Manchester 2, Preston 3, Leigh M.B. 2, Whiston R.D. 2); Stafford 7 (Smethwick C.B. 1, Stafford M.B. 1, Brierley Hill U.D. 1, Wednesbury M.B. 4); Yorks, West Riding, 7 (Leeds 3, Wakefield 2, Dewsbury 1, Sheffield 1). In Scotland notifications of dysentery were received from Aberdeen burgh 8, county 6, Edinburgh 6, Dundee 3, Glasgow 3, Clydebank 2, and 1 each from the burgh of Coatbridge and the counties of Lanark, and Ross and Cromarty.

No. 46

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended November 16, 1940.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1940					1939 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	129	13	32	1	7	37	1	10	7	1
Deaths		3	3				—	1		
Diphtheria	1,408	30	457	12	36	963	29	227	53	45
Deaths	52	3	5	4	5	29	1	2	3	2
Dysentery	97	—	31	2	—	46	1	39	—	—
Deaths			—	—	—			—	—	—
Encephalitis lethargica, acute	4	—	2	—	—	1	—	—	1	—
Deaths		2	1				3	—		
Enteric (typhoid and paratyphoid) fever	22	1	7	2	—	22	—	5	3	1
Deaths	4	—	1	—	—	1	—	—	1	—
Erysipelas		16	58	5	7		—	72	6	9
Deaths		—	—				—	—		
Infective enteritis or diarrhoea under 2 years										
Deaths	28	3	14	4	3	31	3	7	8	1
Measles	13,114	190	486		24	1,830	13	18		28
Deaths	20	—	2‡	1	—	1	—	—	—	—
Ophthalmia neonatorum	72	4	21		—	81	4	21		—
Deaths										
Pneumonia, influenzal*	698	26	6	—	6	637	46	8	4	19
Deaths (from influenza)	33	3	2	3	1	31	8	3	1	—
Pneumonia, primary			207	6				139	5	
Deaths†		38		12	2		9		8	9
Polio-encephalitis, acute	5	—				1	—			
Deaths		—					—			
Poliomyelitis, acute	22	—	4	1	—	13	1	—	—	—
Deaths		—	—				—	—		
Puerperal fever	—	—	4	3	—	—	—	11	1	—
Deaths		—					1§			
Puerperal pyrexia	128	2	8		1	174	6	28		4
Deaths										
Relapsing fever	—	—		—	—	—	—		—	—
Deaths										
Scarlet fever	1,684	53	268	74	51	1,359	34	240	68	96
Deaths	1	—	—	1	—	1	—	1	—	1
Small-pox	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—		—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough	2,032	15	188		12	1,334	35	25		7
Deaths	10	1	3‡	—	1	3	1	2	—	—
Deaths (0-1 year)	280	16	77	22	22	270	39	55	29	16
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	5,490	1,201	630	168	130	4,494	715	612	185	121
Annual death rate (per 1,000 persons living)			12.7	11.2	11.4			12.4	12.4	10.6
Live births	4,627	378	763	298	147	5,484	664	757	286	222
Annual rate per 1,000 persons living			15.4	19.9	12.9			15.3	19.2	19.5
Stillbirths	185	14	46			235	35	41		
Rate per 1,000 total births (including stillborn)			57					51		

* Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

† Since January 1, 1940, figures for London (b) have been for deaths from all forms of pneumonia; the corresponding figures for 1939 relate to deaths from lobar pneumonia only.

‡ Notification in certain administrative areas only.

§ Death from puerperal sepsis.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

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QUERIES AND ANSWERS

Income Tax

Government Appointment—Expenses

"P. L. K." receives a salary and a mileage allowance for the use of his car. He has also found it "necessary . . . to spend a considerable sum in laboratory furnishings and other secretarial necessities."

*** The mileage allowance is intended to cover the necessary cost, including depreciation, in so far as it arises from official journeys. "P. L. K." is unlikely to succeed in convincing the assessing authority that the expenses "wholly, exclusively, and necessarily" incurred by him in the performance of his duties are in excess of the Government allowance. The same difficulty arises over the "furnishings," etc. Apart from the fact that some of them may represent capital outlay on equipment, the assessing authority is almost certain to take the view that the Government will have supplied necessities or will reimburse him for the cost if purchased direct by him. Subscriptions to the B.M.A. and other societies are allowable if membership of the society in question is a condition of the employment.

Payment by Defence Bonds

"M. C." has recently returned to practice work, and as her husband is an income-tax payer the tax payable by her will be high relatively to her salary. She inquires whether, if the money is now invested in national defence bonds, these bonds will be accepted at their nominal value in payment of income tax when it becomes due.

*** We understand that the answer is "No," but if "M. C." thinks it worth while inquiry might be made of the Treasury, Whitehall, London. (Deposit in the Post Office Savings Bank may be a possible alternative course.)

Reduction in Profits of Practice

"C. McC." is one of three partners in a firm; two members are in the R.A.M.C. and an assistant has been engaged at £600 a year. The profits for 1940–1 are considerably less than those of 1939–40, which form the basis of the current year's Schedule D assessment. Army pay is being taxed on the current year's basis, and as a result tax is assessed, in the aggregate, at more than the income which is being earned.

*** A claim should be lodged with the local inspector of taxes by each partner under Section 23 of the Finance Act, 1940. Under that provision, if an individual proves that his earnings for the actual year have fallen short of his assessed earnings by more than 20% he can claim to have the assessments based on the earnings of the actual, instead of the basis, year.

Motor Car Expenses

"EX-SUPERINTENDENT" still holds an appointment as director of research laboratories, but almost all his time is spent working in an honorary capacity for a local hospital. Can he claim an allowance for the cost of maintaining a motor car?

*** The difficulty in this case is that the car is apparently used for honorary work—that is, there is no remuneration in earning which the cost of maintenance can be regarded as "incurred wholly, exclusively, and necessarily in the performance of the duties of the office." It should also be borne in mind that the expense of travelling between the residence and the place of employment is by judicial authority not admissible as an income tax deduction. On the facts stated there appears to be no legal claim to the allowance.

Guarantee Premium

"J. F." pays £10 per annum for a guarantee premium in connexion with a loan from an insurance company. Can he deduct the amount as an expense for income-tax purposes?

*** We cannot advise "J. F." to appeal against the inspector's refusal of the deduction. The expense is incurred not so much in the carrying on of the profession as in connexion with the capital transaction on the loan, and would, we think, probably be refused on appeal, though there is no judicial decision on the precise point. Interest is an unsafe parallel; annual interest is not deductible save in certain specific exceptions—for example, interest paid to a bank.

LETTERS, NOTES, ETC.

Two Interesting Cases

Dr. J. CLUTTON-BROCK (Lincoln) writes: I thought perhaps a short account of the following two cases might be of interest to your readers, as opening a possibility for further investigation. The first was a lady of 56 who was admitted to the Bridgwater Hospital, where I was house-surgeon, suffering from severe pernicious anaemia. She had well-marked signs and symptoms of subacute combined degeneration as well. Her anaemia cleared up rapidly with liver until it was only possible to detect that she had been anaemic by the mean cell volume. The "subacute combined," however, became steadily worse. She became incontinent of urine and faeces, and suffered great pain in the legs, which were quite paralysed. I gave her 0.45 gramme of nicotinic acid per day by mouth, in divided doses. She rapidly improved, and when I left was walking with the aid of a stick. Whether the nicotinic acid was the cause of the improvement I do not know. The second was of a man of 25 with severe ulcerative colitis; the usual courses of treatment (enemata, etc.) were tried without sustained success. Eventually he underwent an operation for an appendicostomy, but still did not improve greatly, having a temperature of over 100° F. every night. Remembering the Americans and oxygen, I gave him enemata of hydrogen peroxide, giving him sufficient H_2O_2 (diluted) to make two pints of oxygen. The temperature came down and remained down, with the exception of one slight rise. The improvement appeared to be sustained. These cases, of course, are meaningless by themselves, and I had hoped to find others, but have not done so. I am indebted to Mr. J. Coates, honorary physician to the Bridgwater Hospital, for permission to publish these cases.

Carrying a Charged Syringe

Dr. EVELYN F. BEBBINGTON (Liverpool) writes: Perhaps the method I have used as convenient for carrying charged sterile 1-c.cm. syringes may be of use to Dr. E. B. Grogono (November 9, p. 643), or he may be able to improve on it. A surgical ligature screw-stoppered glass tube is taken and boiled. The screw stopper must be complete with rubber or cork lining, in order not to blunt the needle. The charged syringe is placed, after sterilization, needle upwards in the glass tube. Care must be taken to use only needles which fit well on to the syringe and do not leak. Several of these can be carried in the pockets of a fitted doctor's bag or even in the pockets of a great-coat. If the cardboard cartons in which the tubes are supplied are added so much the better.

Cerebrospinal Fever

Dr. GEORGE G. CROWE (Nuneaton) writes: I should like to agree with the findings of Dr. W. F. Corfield in his letter (November 16, p. 682). I have used sulphapyridine soluble in many surgical cases by intramuscular injection where vomiting occurs with oral administration and is not relieved by small doses of sodium bicarbonate. I have questioned patients and ward sisters in various hospitals and have seen no complications, apart from slight pain resulting from injection into the gluteal muscles without any particular precautions. In my experience vomiting after oral administration of sulphapyridine occurs mainly in female patients.

Doctors as Home Guards

"J. L." writes: "L.D.V.'s" letter (November 9, p. 656) is interesting and illuminating. I am one of those "too old doctors" (62 years), at present doing voluntary work in Bermondsey persuading mothers to allow their children to be evacuated (pretty strenuous work), for the simple reason there is no medical work under the E.M.S. for men of that age. I am physically fit, retired from a large general practice two years ago, done all sorts of voluntary work, including hospital supervision (general, maternity, children, and sanatoria) and construction for thirty years. I think, like "L.D.V.," I might be doing something more helpful in this crisis, but perhaps I am suffering from the same disability as the officer he mentions—"friendless."